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E-SYSTEMS

Montek Division



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Report No. 131500-614  
12 August 1977

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ADB022524

HUMIDITY TEST REPORT  
FOR THE  
AN/TRN-41 TACAN NAVIGATIONAL SET

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Department of the Air Force, Headquarters Electronic  
Systems Division (AFSC), Hanscom Air Force Base,  
Massachusetts 01731, Attention: PPG.



Prepared for:  
Department of the Air Force  
Headquarters Electronic Systems Division (AFSC)  
Hanscom Air Force Base  
Massachusetts 01731

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✓  
Contract No. F19628-75-C-0200  
CDRL Item A00Y

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) AN/TRN-41 TACAN Navigational Set		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes the humidity test as defined in the Equipment Test Plan for Navigational Set, AN/TRN-41.		

402 354

# HUMIDITY TEST REPORT

for the

## NAVIGATIONAL SET, TACAN, AN/TRN-41

This report describes the humidity test as defined in the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41, 131500-415.

1. Test Identification. Humidity test as defined in Appendix IV-E (humidity test procedure) of the Equipment Test Plan for Navigational Set, TACAN, AN/TRN-41.
2. Functional Purpose of Test. This test forms a part of the AN/TRN-41 system qualification tests.
3. Test Objectives. To demonstrate that the AN/TRN-41 will meet the humidity requirements of paragraphs 3.2.5.1.2 and 4.2.1.4.3.3 of Specification No. 404L-701-5017A, Part 1 of 2 parts (20 August 1976).

4. Description of Test Article. The AN/TRN-41 system consisting of the following was used for the tests:

Receiver-Transmitter	RT-1202/T
Antenna	AS-3132/T
Antenna Support	AB-1237/T
Filter, DC Power	F-1439/T
Interconnecting Cables	

ACCESS FOR	Wire Section	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
NTIS	DOC	UNANNOUNCED	JUSTIFICATION	
BY	DISTRIBUTION/AVAILABILITY CODES			
Dist.	SP. CIAL			
B				

5. Summary of Test Results. The AN/TRN-41 showed no functional degradation during the humidity test. Some parts showed rust during the test. These parts are being replaced with corrosion resistant parts.

6. Description of Test Facilities and Procedures. The test facilities and test procedures are described in Appendix IV-E of the Equipment Test Plan.

7. Test Setup Diagrams. The test setup diagrams are provided in Appendix IV-E of the Equipment Test Plan.

8. Test equipment. See Attachment 1 for test equipment used for the humidity test and the pre-test, test, and post-test operational tests.

9. Test Data. Attachment 2 contains the data sheets for the humidity test, pre-test, test, and post-test operational tests and the temperature charts from the chamber controller and recorder.

10. Test Conditions. The system was conditioned and operated under conditions given in Appendix IV-E of the Equipment Test Plan.

11. Test Results Analysis. Comparison of the pre-test, test, and post-test operational data showed no functional degradation during the humidity test. Some parts, as described on the humidity test data sheet in Attachment 2, exhibited rust. These parts were expedited for use on preproduction systems and did not meet the requirements of the specification control drawings. The parts used on production systems will have proper corrosion resistant characteristics. Moist air was evident inside the RT when it was opened; however, no indication of condensation was observed that would affect performance.

12. Certification. The data sheets shown in Attachment 2 have been signed by a Montek Quality Assurance representative and a DCAS representative, certifying that the test results are authentic, accurate, current and in accordance with the related test plan.

**ATTACHMENT 1**

**TEST EQUIPMENT**

# TEST EQUIPMENT

<u>Description/Manufacturer</u>	<u>Model</u>	<u>Calibration Due Date</u>
Oscilloscope, Tektronix	465	7/6/77
Signal Generator, RF. H.P.	612A	6/23/77
Peak Power Meter, HP	8900B	9/19/77
Pulse Generator, Data Pulse	110B	5/12/77
Counter, Fluke	1953	8/12/77
Half-Ampl. Det. Montek	131500-702	N/A
RF Detector, Montek	135203-100	N/A
Monitor Ant., Montek	006300	N/A
Test Box - Interconnection - Montek	131500-703	N/A
Power Supply HP	6274B	1/16/78
Power Supply Acopian		12/9/77
Power Supply, Sorensen	QR4075A	9/19/77
Directional Coupler 20 dB, Narda	3042B	N/A
Directional Coupler 10 dB, Microlab	CBA-78	N/A
Variable Attenuator, Weinschel 0-10 dB	905	N/A
RF Attenuator, Weinschel	10 dB	N/A
Multimeter, Fluke	8120A	8/2/77
Humidity Chamber, Conrad	WD-640-705	9/2/77



**ATTACHMENT 2**

**DATA SHEETS**

APPENDIX IV-K  
DATA SHEET  
ENVIRONMENTAL TEST

131500-415

June 30, 1976

TEST Humidity \_\_\_\_\_  
SYSTEM 003 \_\_\_\_\_

from 15 April 1977  
DATE to 30 April 1977  
ACCEPTABLE X  
NOT ACCEPTABLE \_\_\_\_\_

REMARKS

At the conclusion of the humidity test, the system operated properly. There was no degradation in performance based on comparison of test data. Listed below are the noted mechanical discrepancies observed during visual inspection. Engineering (Mechanical) is presently evaluating parts noted for corrective action, and resolution prior to production.

Note: Upon opening Receiver-Transmitter there was evidence of moist air inside unit. However, no indication of condensation was observed which would affect performance.

DISCREPANCIES

The spring pin, P/N MS16562-216 shows evidence of rust, used on tripod leg.

The thumb screw, P/N 910569-001 used on tripod leg shows evidence of rust.

The 1/4 turn fasteners D- Ring, P/N .930048, used on the tripod base for mounting the receiver transmitter to the tripod is rusted.

The receiver cover, P/N 149042-002, shows some very minor evidence of blistering.

SIGN OFF INFORMATION

ENVIRONMENTAL TEST ENGINEER J. Dickinson DATE 5/6/77

REPRESENTATIVE ENGINEER B. D. Taylor DATE 5/6/77

QA REPRESENTATIVE M. B. Hunt DATE 5/6/77

DCASD OR AF CONCURRENCE Phil M. M. M. DATE 5-6-77

DATA SHEET  
OPERATIONAL TESTS  
AN/TRN-41

JUNE 30, 1976

11:53 19-Apr-77  
20 Apr 77  
21 Apr 77

Test PRE - HUMIDITY

Date April 19, 1977

System S/N -001- TRIPUS

DC Filter S/N 001

Time 8:10 am

003

004 - ANTENNA

001 RT

VERIFIED MB

Tech 4-21-77  
4/20/77

Para. No.	Description	Pre Test MB	24 Hr Test MB	44 Hr Test MB 8:10 AM	Requirements	Units
6.1	Calibrated RF insertion loss $P_L = 31.3$ dB Used in determining RF peak power.	N/A	N/A	N/A	N/A	N/A
6.2	System turn on normal operation	✓	✓	✓	Check if OK	N/A
6.3.1	Antenna radiated signal 15 Hz	✓	✓	✓	Check if OK	N/A
	135 Hz	✓	✓	✓	Check if OK	N/A
6.3.2	Antenna Speed				66.667 ± .133	ms
6.4.1.1	Correct identity code	✓	✓	✓	Check if OK	N/A
6.4.1.2	Identity period	66.667	66.665	66.666	37.5 ± 3.75	Seconds
6.4.2	Peak power (1) Reading of peak power meter $P_m =$ (2) Convert to dBm - $10 \log$ $P_m \times 10^3 = P_{in} \text{ dBm}$ Total power output in dBm $P_{m \text{ dBm}} + P_L =$ *Insertion loss see 6.1 above.	84 mW 19.24 dBm 50.54 dBm	82 mW 19.316 dBm 50.44 dBm	83 mW 19.19 50.49	N/A N/A 50 dBm	Watts dBm dB
6.4.3.3	Pulse count	7180	7181	7185	7200 ± 180	Counts
6.4.4.2	Pulse shape Width (50%) Rise time (10-90%) Fall time (90-10%)	3.6 μs 2.0 μs 2.45 μs	3.6 μs 2.0 μs 2.4 μs	3.6 μs 2.0 μs 2.5 μs	3.5 ± 0.5 2 ± 0.25 2.5 ± 0.5	μs μs μs
6.4.4.4	Pulse spacing	12.0 μs	12.0 μs	12.0 μs	12.0 ± 0.1	μs
6.4.5.2	Delay - 60 ± 10 μs 15 Hz trig to first burst pulse.	✓	✓	✓	Check if OK	

June 30, 1976

DATA SHEET  
OPERATIONAL TESTS  
AN/IRN-41 (Continued)

Para. No.	Description	Pre Test	Test	Post Test	Requirements	Units
6.4.5.3	Correct north Burst - 12 pulse pairs spaced $30 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.5.5	Delay $60 \pm 10 \mu s$ - 135 Hz trig to first burst pulse	✓	✓	✓	Check if OK	
6.4.5.6	Correct Aux burst - 6 pulse pairs spaced $24 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.6.5	RT replies to 3300 interrogations	2477	2474	2530	$\geq 2310$ (Counts/Second)	
6.4.6.7	Demand only mode - times to switch from ON to STBY within 70 seconds	✓	✓	✓	Check if OK	
6.4.6.8	STBY mode	✓	✓	✓	Check if OK	
6.4.6.9	Demand Only mode - time to switch from STBY to ON $\leq 15$ sec	*	✓	✓	Check if OK	
6.4.6.10	ON AIR mode	✓	✓	✓	Check if OK	
6.4.7.1	DME ONLY mode	✓	✓	✓	Check if OK	
6.4.7.2	Switch from DME to TACAN	✓	✓	✓	Check if OK	
6.4.8.1	Antenna Alarm - Within four seconds	✓	✓	✓	Check if OK	
6.4.8.2	Alarm Reset	✓	✓	✓	Check if OK	
6.4.8.3	RT Alarm - Within five seconds	✓	✓	✓	Check if OK	
6.4.8.4	Alarm Reset	✓	✓	✓	Check if OK	

\* NOTE - TURNS ON IN 16 SECONDS,  
PROCEDURES WAS IN ERROR

DATA SHEET  
OPERATIONAL TESTS  
AN/TRN-41

June 30, 1976

22 April 1977 *Witness*

Test HUMIDITY

Date 22 APRIL 1977

System 001 TRIPED  
004 ANTENNA

Time 10:15 AM

003 001 RT

Tech

Para. No.	Description	4/22/77 Test	4/23/77 Test	4/24/77 Test	Requirements	Units
6.1	Calibrated RF insertion loss $P_L = 3.3$ dB Used in determining RF peak power.	N/A	N/A	N/A	N/A	N/A
6.2	System turn on normal operation	✓	✓	✓	Check if OK	N/A
6.3.1	Antenna radiated signal 15 Hz	✓	✓	✓	Check if OK	N/A
	135 Hz	✓	✓	✓	Check if OK	N/A
6.3.2	Antenna Speed	66.667	66.669	66.668	66.667 ± .133	ms
6.4.1.1	Correct identity code	✓	✓	✓	Check if OK	N/A
6.4.1.2	Identity period	✓	✓	✓	37.5 ± 3.75	Seconds
6.4.2	Peak power (1) Reading of peak power meter $P_m =$ (2) Convert to dBm - 10 log $P_m \times 10^3 = P_m \text{ dBm}$ Total power output in dBm $P_{ndBm} + P_L =$ *Insertion loss see 6.1 above.	* 70mw 77.5mw 18.86 dBm 50.16 dBm	77mw 18.86 dBm 50.16 dBm	77 18.86 dBm 50.16 dBm	N/A N/A 50 dBm	Watts dBm dB
6.4.3.3	Pulse count	7180	7181	7181	7200 ± 180	Counts
6.4.4.2	Pulse shape Width (50%) Rise time (10-90%) Fall time (90-10%)	3.6us 2.0us 12.0us	3.6us 2.1us 12.0us	3.5 2.0 12.0us	3.5 ± 0.5 2 ± 0.25 2.5 ± 0.5	us us us
6.4.4.4	Pulse spacing	12.0us	12.0us	12.0us	12.0 ± 0.1	us
6.4.5.2	Delay - 60 ± 10 us 15 Hz trig to first burst pulse.	✓	✓	✓	Check if OK	

June 30, 1976

DATA SHEET  
OPERATIONAL TESTS  
AN/TRN-41 (Continued)

Para. No.	Description	Pre Test	Test	Post Test	Requirements	Units
6.4.5.3	Correct north Burst - 12 pulse pairs spaced $30 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.5.5	Delay $60 \pm 10 \mu s$ - 135 Hz trig to first burst pulse	64 $\mu s$ ✓	✓	✓	Check if OK	
6.4.5.6	Correct Aux burst - 6 pulse pairs spaced $24 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.6.5	RT replies to 3300 interrogations	2503	2690	2670	$\geq 2310$ (Counts/Second)	
6.4.6.7	Demand only mode - times to switch from ON to STBY within 70 seconds	✓	✓	✓	Check if OK	
6.4.6.8	STBY mode	✓	✓	✓	Check if OK	
6.4.6.9	Demand Only mode - time to switch from STBY to ON	✓	✓	✓	Check if OK	
6.4.6.10	ON AIR mode	✓	✓	✓	Check if OK	
6.4.7.1	DME ONLY mode	✓	✓	✓	Check if OK	
6.4.7.2	Switch from DME to TACAN	✓	✓	✓	Check if OK	
6.4.8.1	Antenna Alarm - Within four seconds	✓	✓	✓	Check if OK	
6.4.8.2	Alarm Reset	✓	✓	✓	Check if OK	
6.4.8.3	RT Alarm - Within five seconds	✓	✓	✓	Check if OK	
6.4.8.4	Alarm Reset	✓	✓	✓	Check if OK	

June 30, 1976

DATA SHEET  
OPERATIONAL TESTS  
AN/TRN-41

Test *Humidity Test*

System *001 Tripod*  
*004 Antenna*  
*001 RT*

*System 003*Date *April 25, 1977*Time *8:10 am*Tech *W. T. Hays*

Para. No.	Description	4-25-77 Test MBL	4/26/77 Test MBL	4-27-77 Post Test	Requirements	Units
6.1	Calibrated RF insertion loss $P_L = 34.3$ dB Used in determining RF peak power.	N/A	N/A	N/A	N/A	N/A
6.2	System turn on normal operation	✓	✓	✓	Check if OK	N/A
6.3.1	Antenna radiated signal 15 Hz	✓	✓	✓	Check if OK	N/A
	135 Hz	✓	✓	✓	Check if OK	N/A
6.3.2	Antenna Speed	66.667	66.667	66.667	66.667 ± .133	ms
6.4.1.1	Correct identity code	✓	✓	✓	Check if OK	N/A
6.4.1.2	Identity period	✓	✓	✓	37.5 ± 3.75	Seconds
6.4.2	Peak power (1) Reading of peak power meter $P_m =$ (2) Convert to dBm - $10 \log$ $P_m \times 10^3 = P_m \text{ dBm}$ Total power output in dBm $P_{m \text{ dBm}} + P_L =$ *Insertion loss see 6.1 above.	76 mw 18.80 50.11	76 mw 18.80 50.11	76 mw 19.80 50.11	N/A N/A 50 dBm	Watts dB
6.4.3.3	Pulse count	7186	7184	7194	7200 ± 180	Counts
6.4.4.2	Pulse shape Width (50%) Rise time (10-90%) Fall time (90-10%)	3.6 us 2.1 us 2.5 us	3.6 us 2.1 us 2.5 us	3.7 2.1 2.5	3.5 ± 0.5 2 ± 0.25 2.5 ± 0.5	us us us
6.4.4.4	Pulse spacing	12 us	12 us	12	12.0 ± 0.1	us
6.4.5.2	Delay - 60 ± 10 us 15 Hz trig to first burst pulse.	✓	✓	✓	Check if OK	

June 30, 1976

DATA SHEET  
OPERATIONAL TESTS  
AN/IRN-41 (Continued)

Para. No.	Description	4/5/77 Pre Test	4/26/77 Test	4/27-77 Post Test	Requirements	Units
6.4.5.3	Correct north Burst - 12 pulse pairs spaced 30 ± 0.1 μs	✓	✓	✓	Check if OK	
6.4.5.5	Delay 60 ± 10 μs - 135 Hz trig to first burst pulse	✓	✓	✓	Check if OK	
6.4.5.6	Correct Aux burst - 6 pulse pairs spaced 24 ± 0.1 μs	✓	✓	✓	Check if OK	
6.4.6.5	RT replies to 3300 interrogations	2488	2680	2,500	≥ 2310 (Counts/Second)	
6.4.6.7	Demand only mode - times to switch from ON to STBY within 70 seconds 80	✓	✓	✓	Check if OK	✓
6.4.6.8	STBY mode	✓	✓	✓	Check if OK	
6.4.6.9	Demand Only mode - time to switch from STBY to ON ≤ 18 sec 20 4/19/77	✓	✓	✓	Check if OK	
6.4.6.10	ON AIR mode	✓	✓	✓	Check if OK	
6.4.7.1	DME ONLY mode	✓	✓	✓	Check if OK	
6.4.7.2	Switch from DME to TACAN	✓	✓	✓	Check if OK	
6.4.8.1	Antenna Alarm - Within four seconds	✓	✓	✓	Check if OK	
6.4.8.2	Alarm Reset	✓	✓	✓	Check if OK	
6.4.8.3	RT Alarm - Within five seconds	✓	✓	✓	Check if OK	
6.4.8.4	Alarm Reset	✓	✓	✓	Check if OK	



Teel

Para. No.	Description	4-28-77 Pre Test	4-29-77 Test	4-30-77 Post Test MAR	Requirements	Units
6.1	Calibrated RF insertion loss $P_L = 31.3$ dB Used in determining RF peak power.	N/A	N/A	N/A	N/A	N/A
6.2	System turn on normal operation	✓	✓	✓	Check if OK	N/A
6.3.1	Antenna radiated signal 15 Hz	✓	✓	✓	Check if OK	N/A
	135 Hz	✓	✓	✓	Check if OK	N/A
6.3.2	Antenna Speed	✓	✓	66.668	66.667 ± .133	ms
6.4.1.1	Correct identity code	✓	✓	✓	Check if OK	N/A
6.4.1.2	Identity period	38 sec	38 sec	38	37.5 ± 3.75	Seconds
6.4.2	Peak power (1) Reading of peak power meter $P_m =$ (2) Convert to dBm - $10 \log$ $P_m \times 10^3 = P_m \text{ dBm}$  Total power output in dBm $P_{m \text{ dBm}} + P_L =$ *Insertion loss see 6.1 above.	76 mw 18.80 dBm	76 mw 18.8 dBm	76mw 18.8 dBm	N/A N/A 50 dBm	Watts dBm dB
6.4.3.3	Pulse count	7180	7180	7184	7200 ± 180	Counts
6.4.4.2	Pulse shape Width (50%) Rise time (10-90%) Fall time (90-10%)	3.7 us 2.1 us 2.5 us	3.7 us 2.1 us 2.5 us	3.6 us 2.1 us 2.5 us	3.5 ± 0.5 2 ± 0.25 2.5 ± 0.5	us us us
6.4.4.4	Pulse spacing	12.0 us	12.1	12.0 us	12.0 ± 0.1	us
6.4.5.2	Delay - 60 ± 10 us 15 Hz trig to first burst pulse.	✓	✓	✓	Check if OK	

June 30, 1976

DATA SHEET  
OPERATIONAL TESTS  
AN/IRN-41 (Continued)

Para. No.	Description	Pre Test	Test	4-20-77 Post Test	Requirements	Units
6.4.5.3	Correct north Burst - 12 pulse pairs spaced $30 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.5.5	Delay $60 \pm 10 \mu s$ - 135 Hz trig to first burst pulse	✓	✓	✓	Check if OK	
6.4.5.6	Correct Aux burst - 6 pulse pairs spaced $24 \pm 0.1 \mu s$	✓	✓	✓	Check if OK	
6.4.6.5	RT replies to 3300 interrogations	2585	2520	2670	$\geq 2310$ (Counts/Second)	
6.4.6.7	Demand only mode - times to switch from ON to STBY within <del>70</del> <sup>80</sup> seconds	✓	✓	✓	Check if OK	✓
6.4.6.8	STBY mode	✓	✓	✓	Check if OK	
6.4.6.9	Demand Only mode - time to switch from STBY to ON <del>15</del> <sup>20</sup> sec 4/19/77	✓	✓	✓	Check if OK	
6.4.6.10	ON AIR mode	✓	✓	✓	Check if OK	
6.4.7.1	DME ONLY mode	✓	✓	✓	Check if OK	
6.4.7.2	Switch from DME to TACAN	✓	✓	✓	Check if OK	
6.4.8.1	Antenna Alarm - Within four seconds	✓	✓	✓	Check if OK	
6.4.8.2	Alarm Reset	✓	✓	✓	Check if OK	
6.4.8.3	RT Alarm - Within five seconds	✓	✓	✓	Check if OK	
6.4.8.4	Alarm Reset	✓	✓	✓	Check if OK	

FACILITY:

# ENVIRONMENTAL DATA SHEET ENVIRONMENTAL LABORATORY — DEPT. 330

C-II

A.O. 298K-143	ENV. TECH.	TEST SCHED. 4/15/77
ENGINEER OR Q.C. M. Rogers (E'system)	PHONE	TEST COMPLETED 5/2/77
TECHNICIAN	PHONE	TEST REMOVED
UNIT TITLE AN/TEN-91 (THCAN)	SER.	QTY. 1
TOTAL UTILIZATION		

INSTRUCTIONS TO OPERATOR	TEST TO TERMINATE:	BY:	ENVIRONMENTAL LABORATORY SUPERVISORS APPROVAL  4/15/77 DATE
	1. High Temp 130°F for 24 hrs		
	2. 13°F, 50% humidity for 24 hrs		
	3. operate		
TEST Humidity	4. start cycle		
SPEC. MIL-S-810C			
PAR. Proc. II			

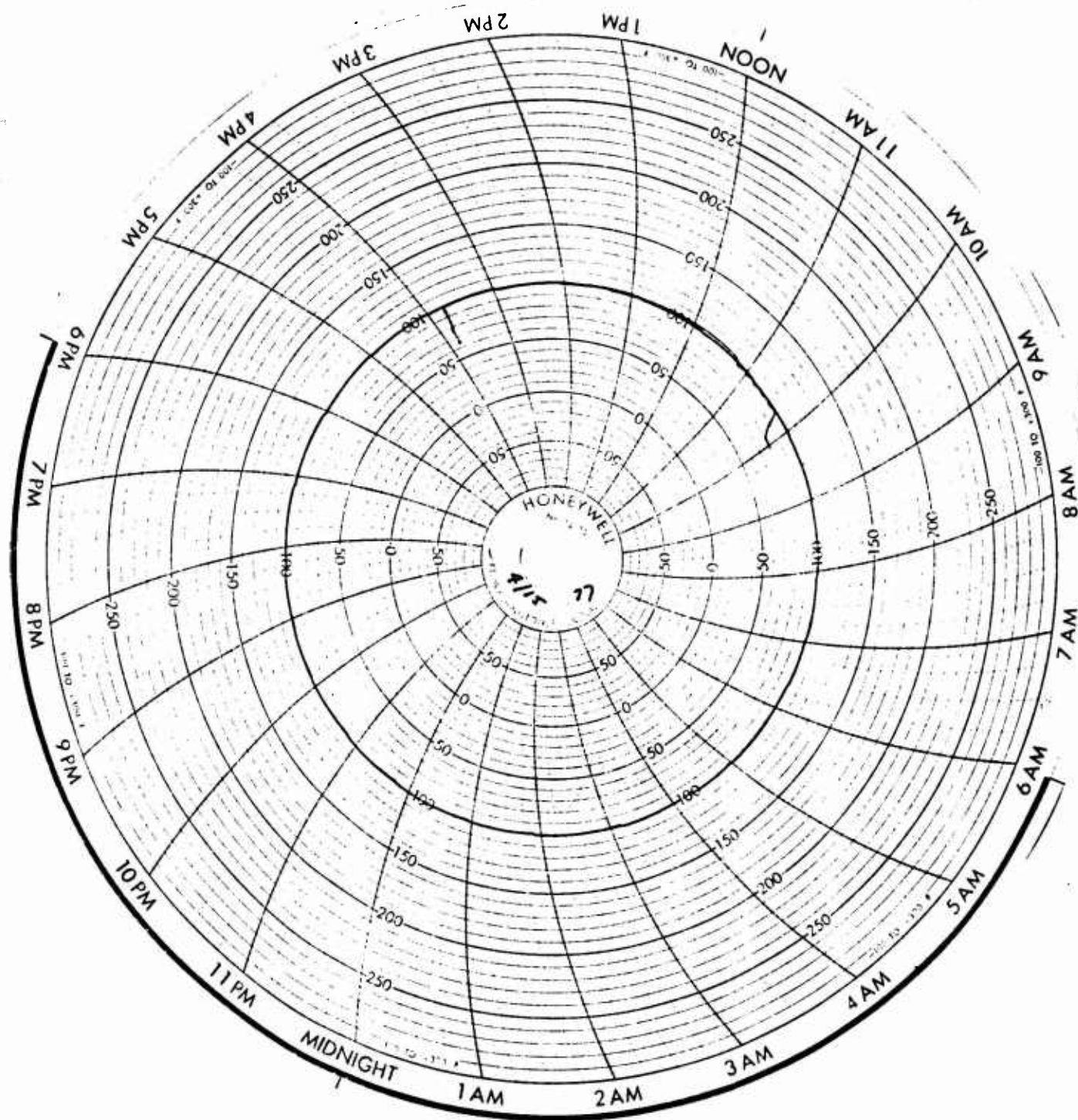
DATE	TIME	CHRONOLOGICAL RECORD OF TEST	INITIALS (PRINT)
4/15/77	1600hr	set Temp to 130°F, for 24 hrs.	DLB
4/16/77	1800	change dry bulb Temp to 73°F + wet bulb to 62°F, change charts	DLB
4/18	1232	open door to conduct Tests prior to Humidity cycling	DLB
4/19	835	start humidity cycling	DLB
4/20/77	8:33	change charts	DLB
		W. Bulb chart slipped off pin, did not rotate. readjusted perpendicular band and reset to reduce Temp deviations	
4/21/77	8:55AM	change charts	DLB
4/22/77	8:45AM	changed charts. Dry bulb chart did not rotate during the last 24 hr period.	DLB
4/23	1000	changed to Chart #8, STD.	JCD
4/24	9:45	changed to chart #9 & wet bulb chart pen not on chart. it was left in a held position at the change of number 8 chart. opened door to check wet bulb wick	DLB
4/25	10:00AM	changed charts & standardized	DLB
4/27	10:00AM	changed charts & standardized	DLB
4/28	10:00AM	change charts & standardize	DLB

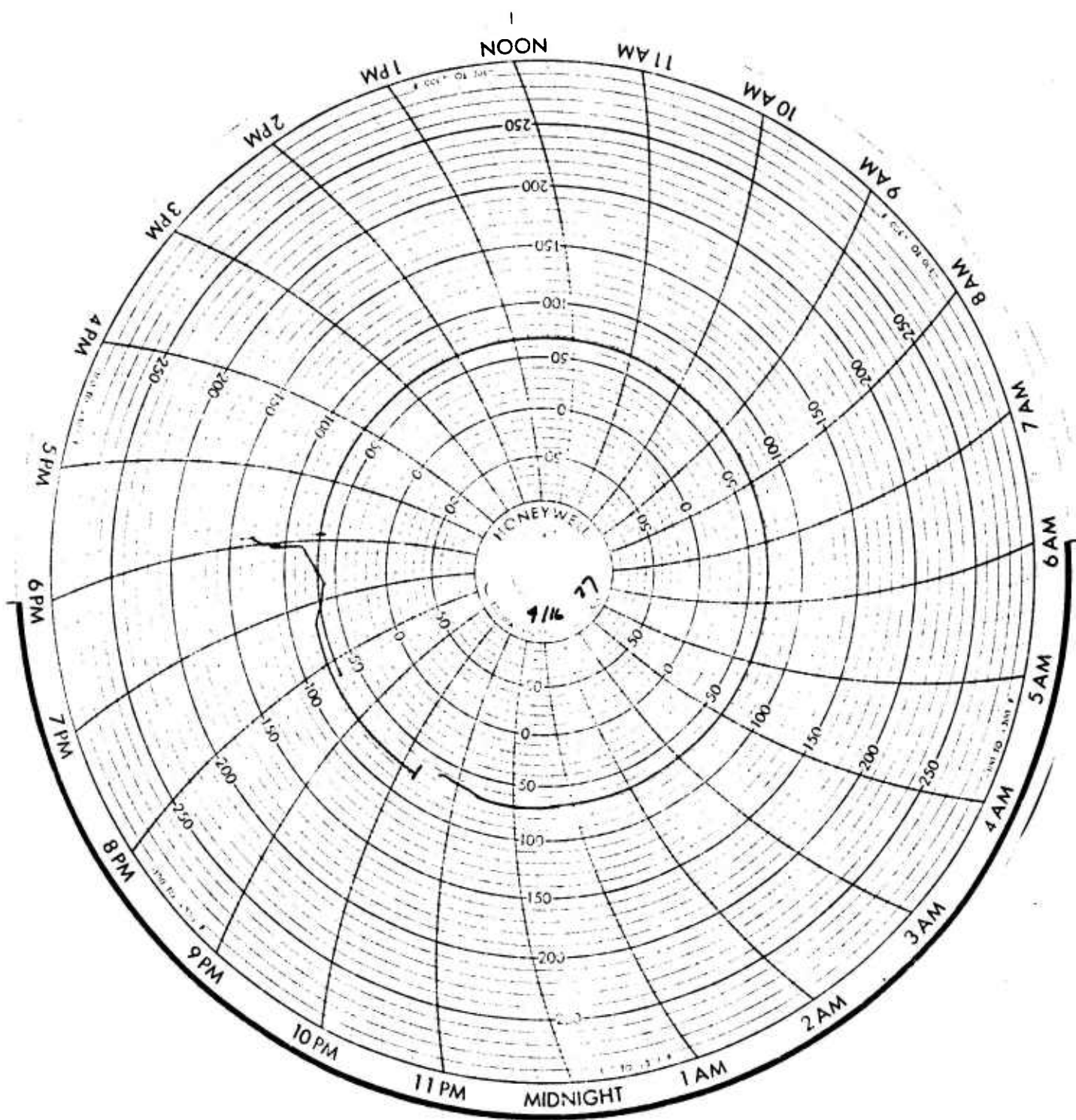
VERIFIED &amp; RELEASED BY:

Q.C. OR PROGRESS

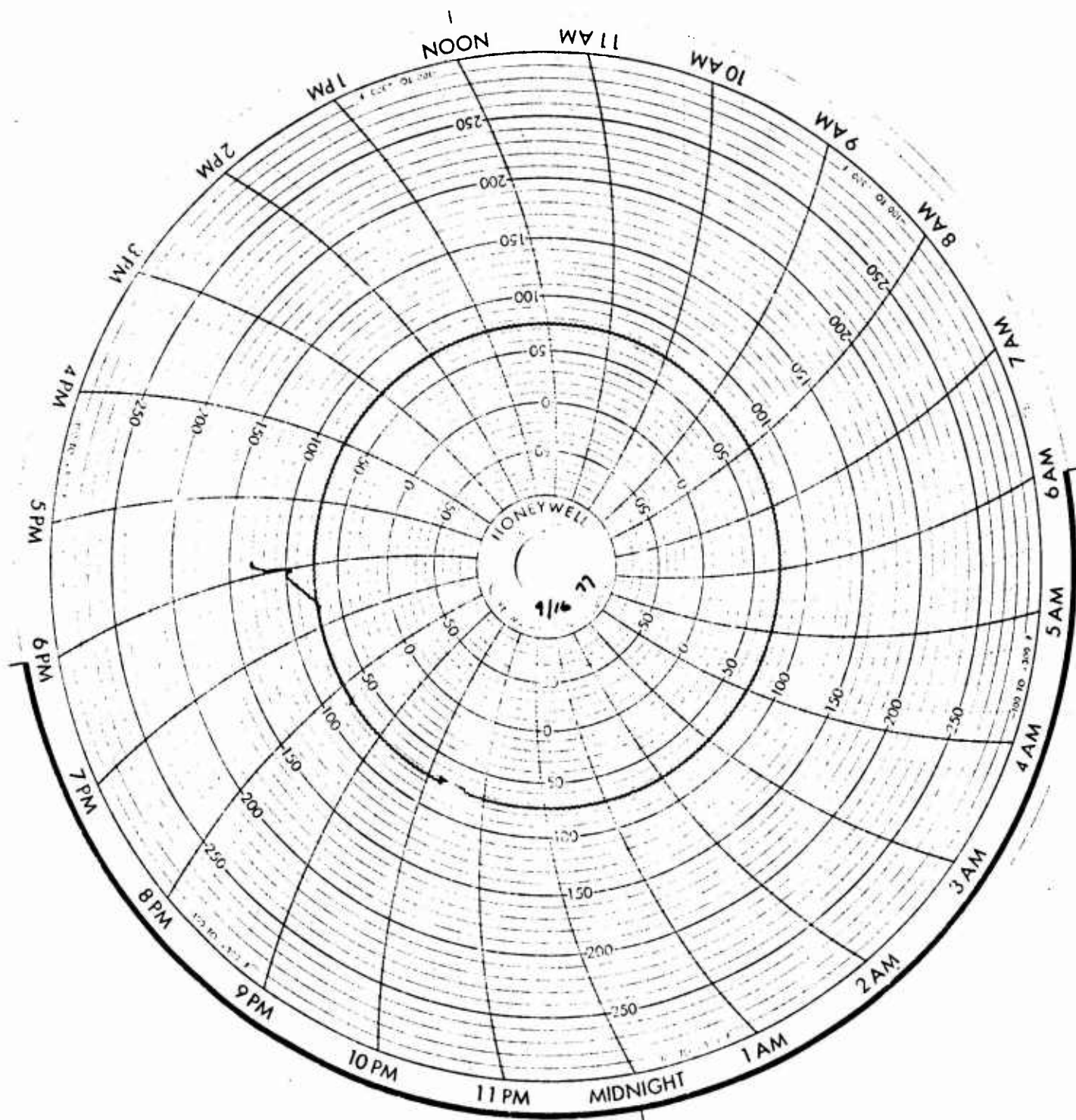
COGNIZANT ENGINEER

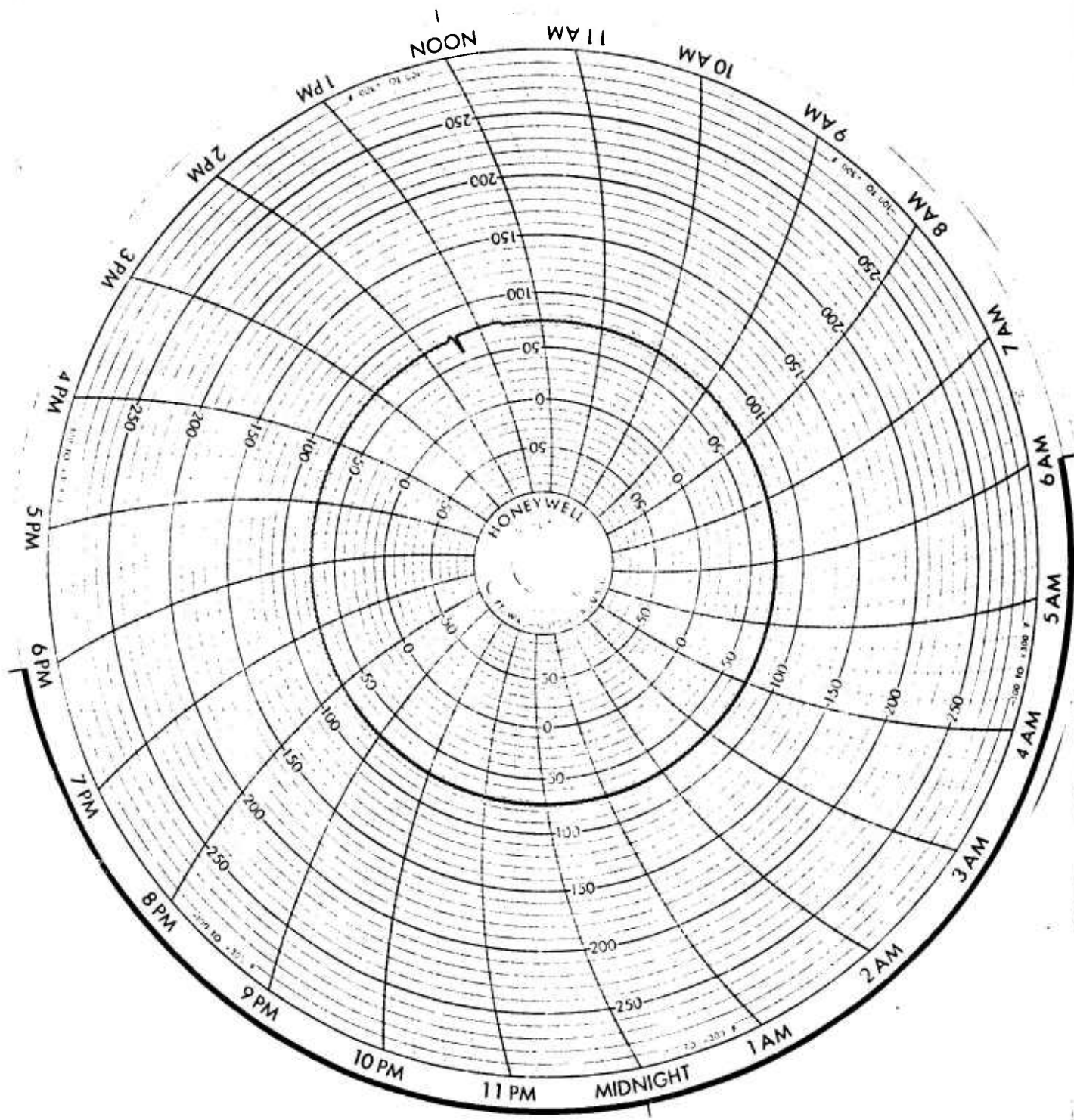
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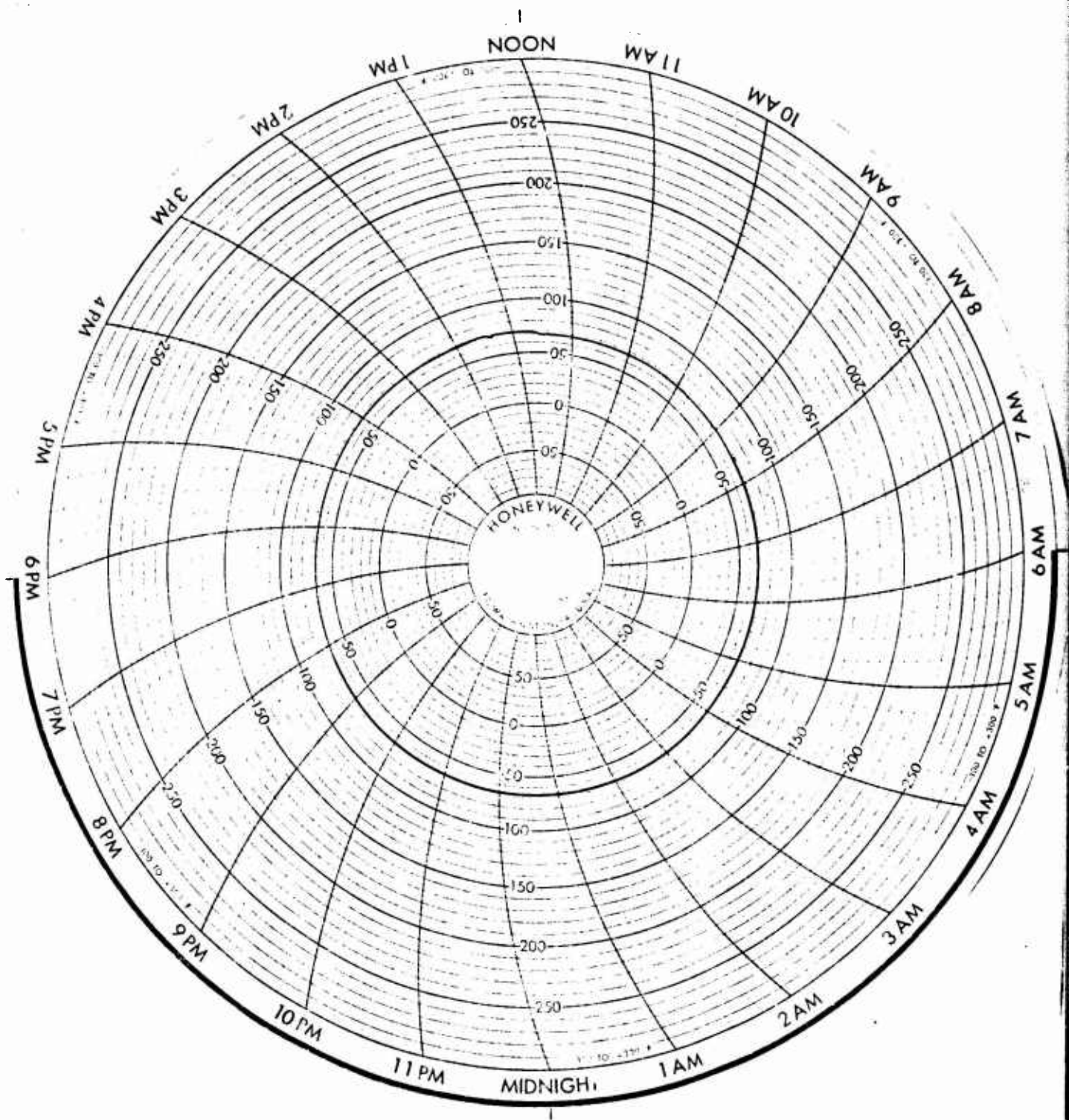


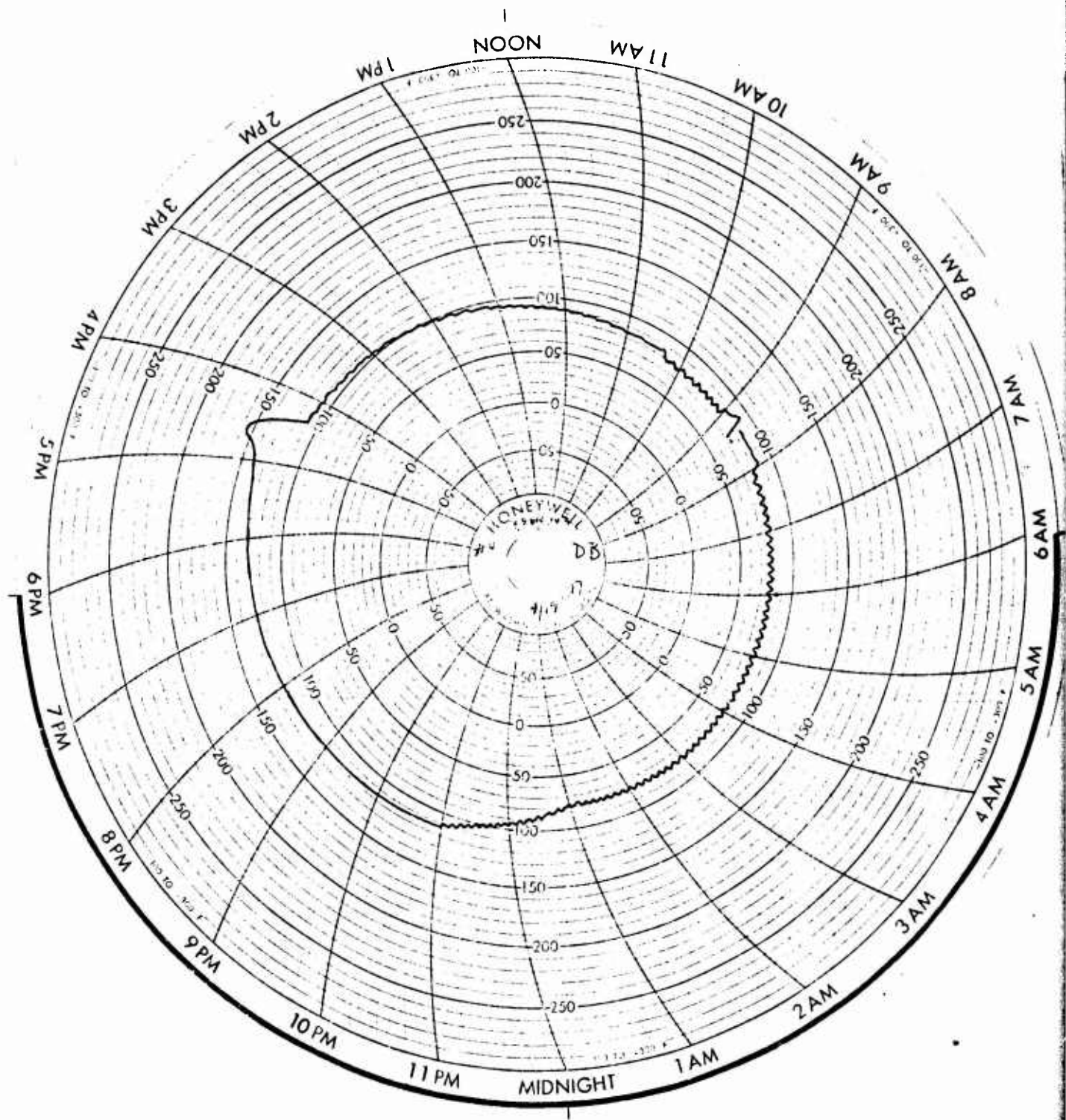


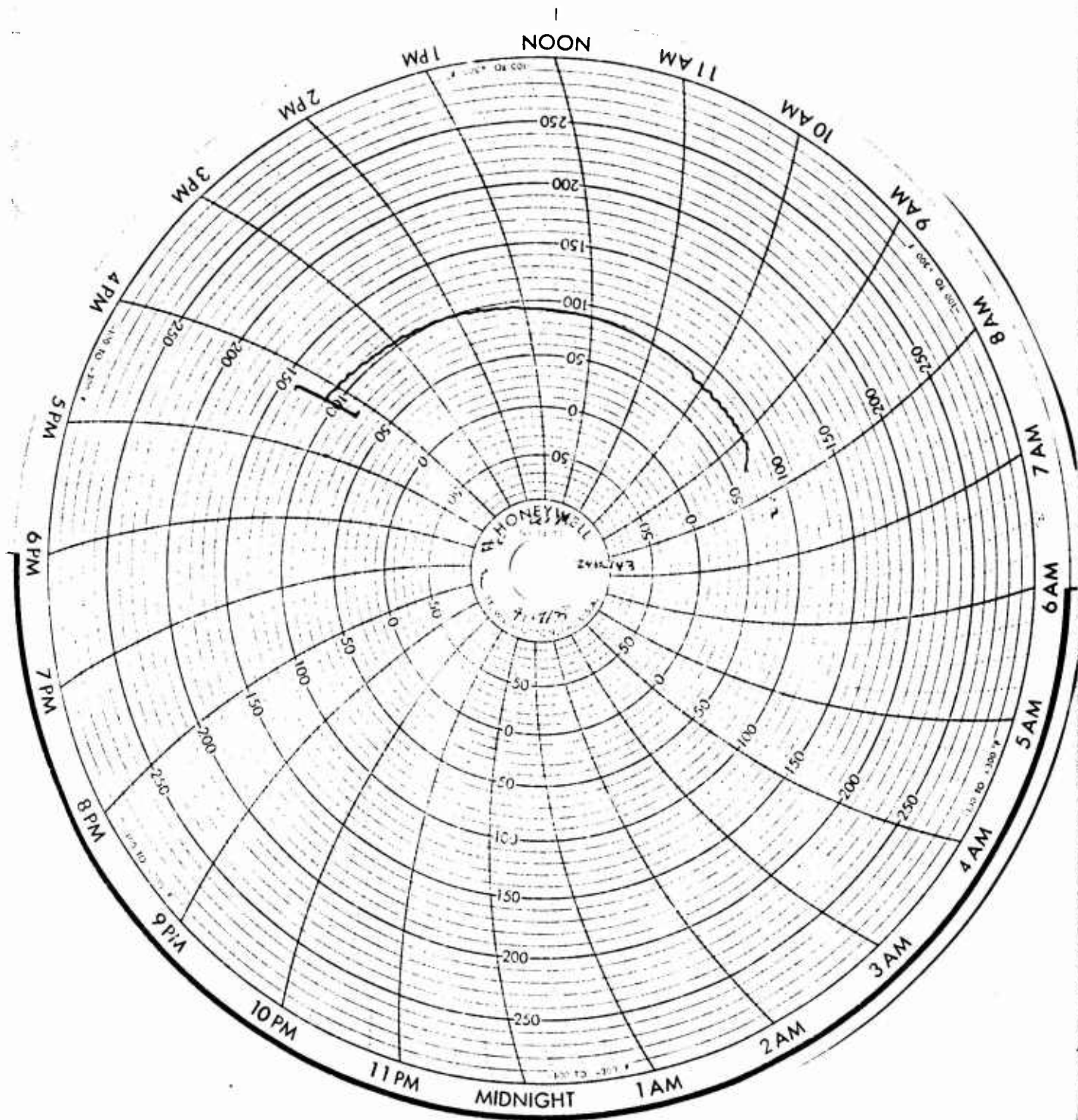




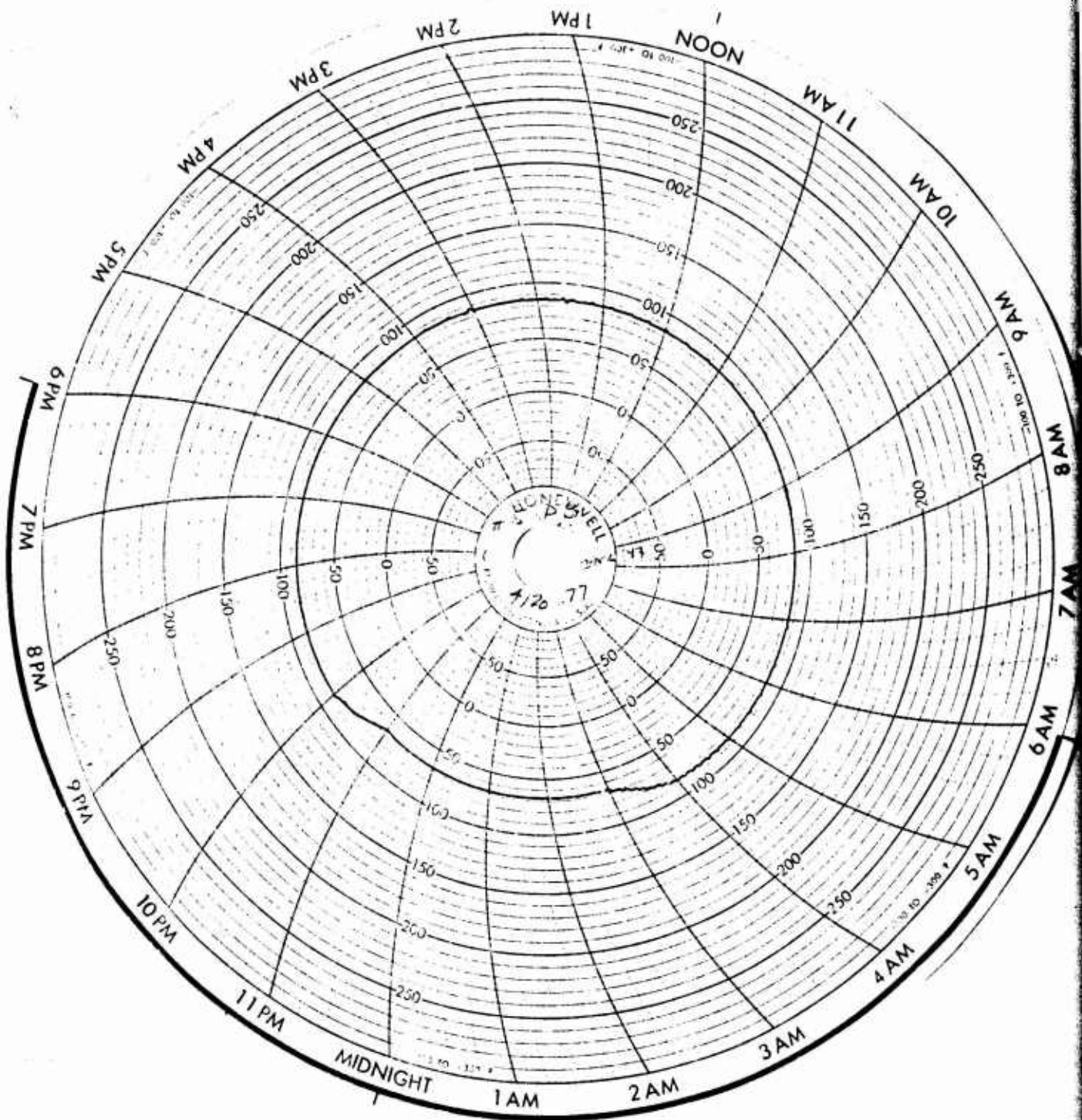


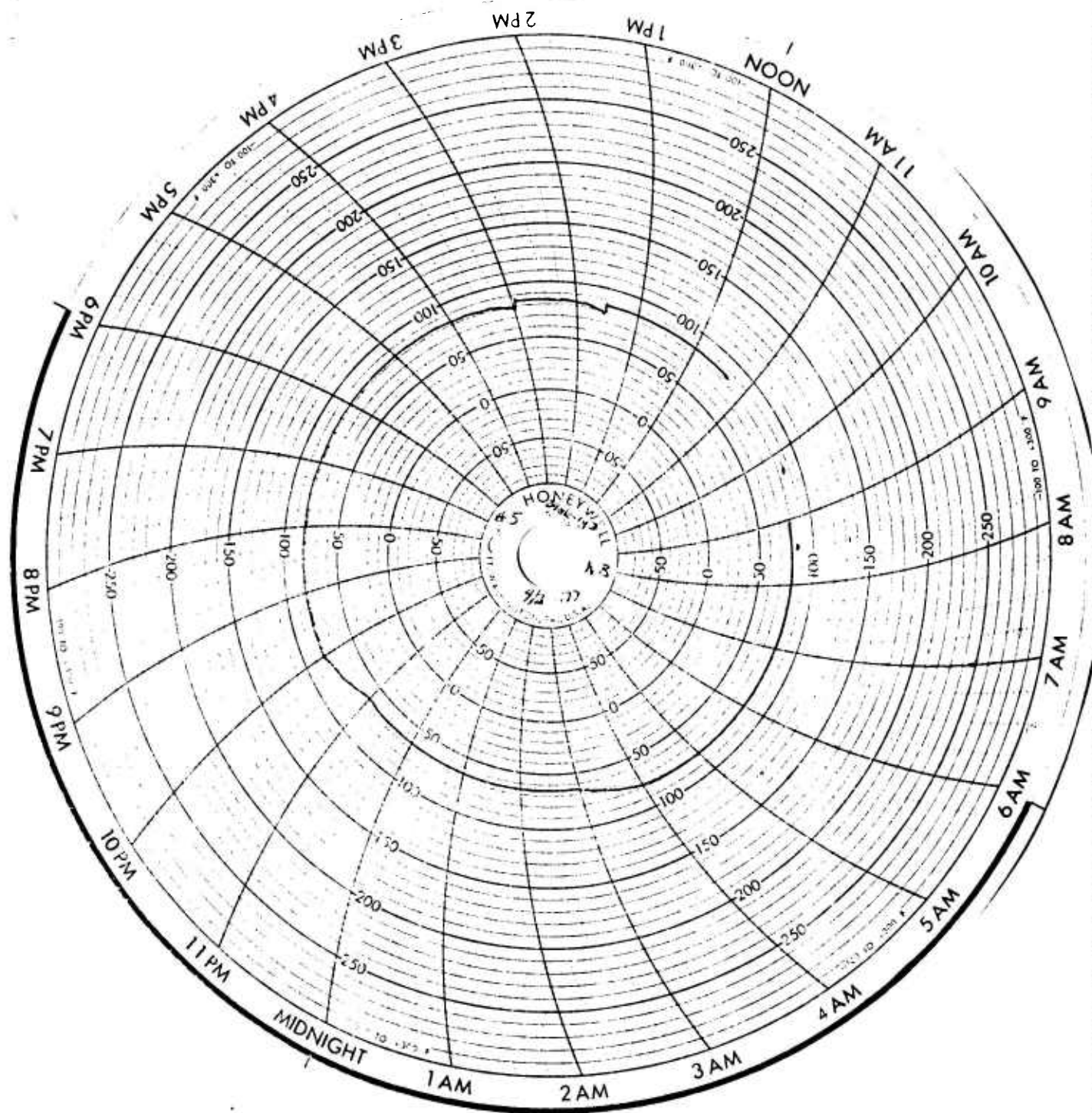


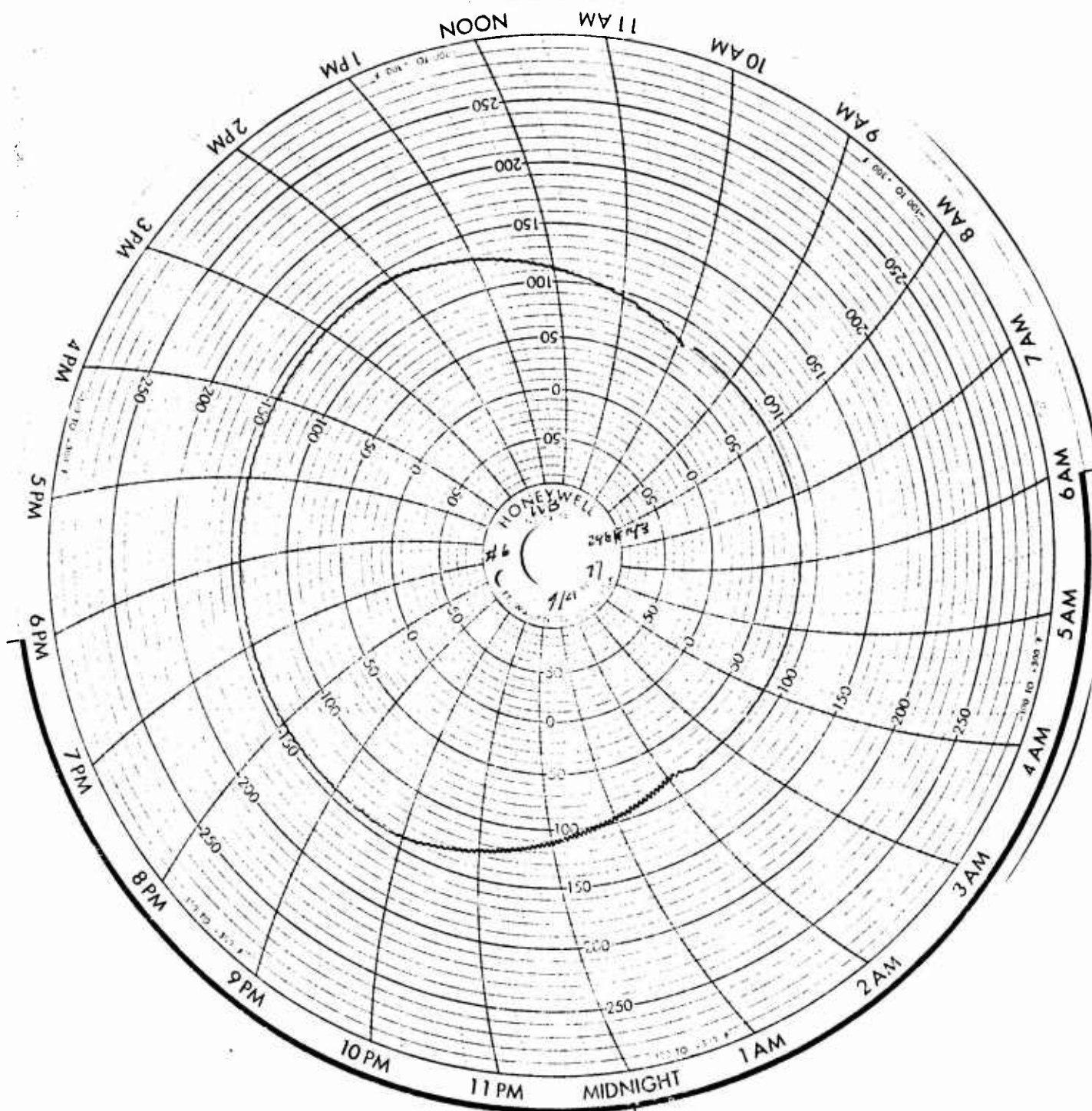




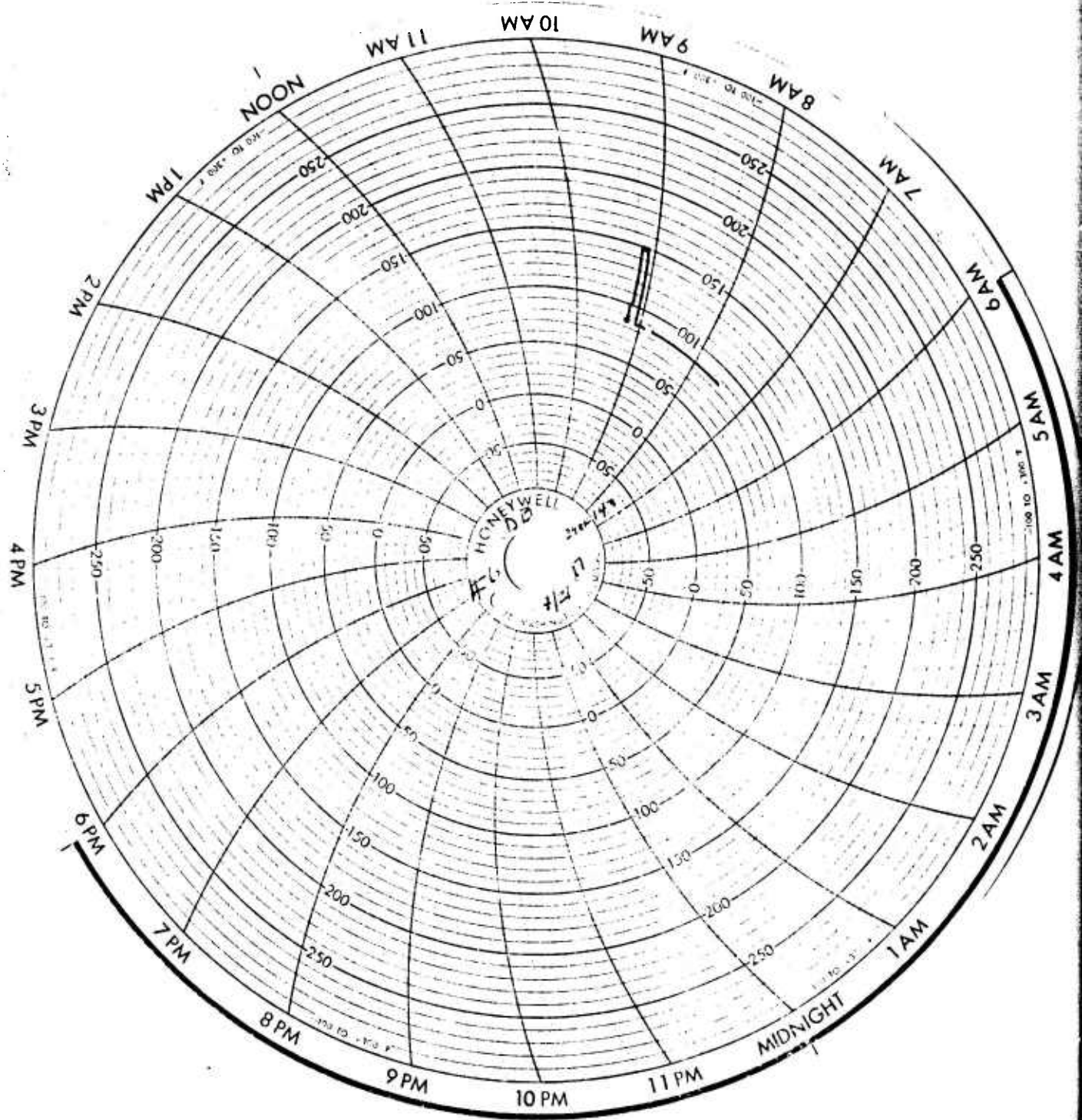


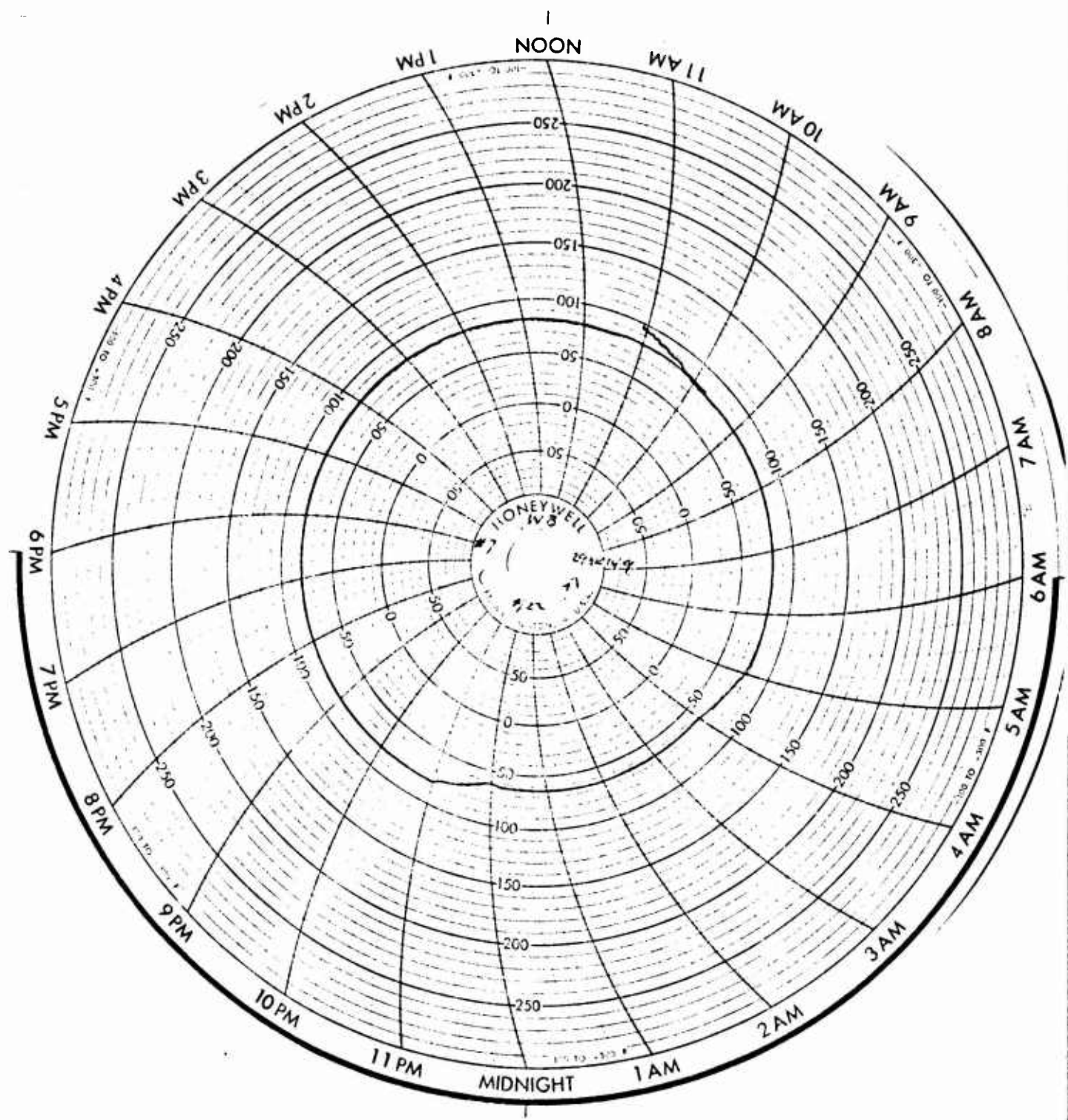




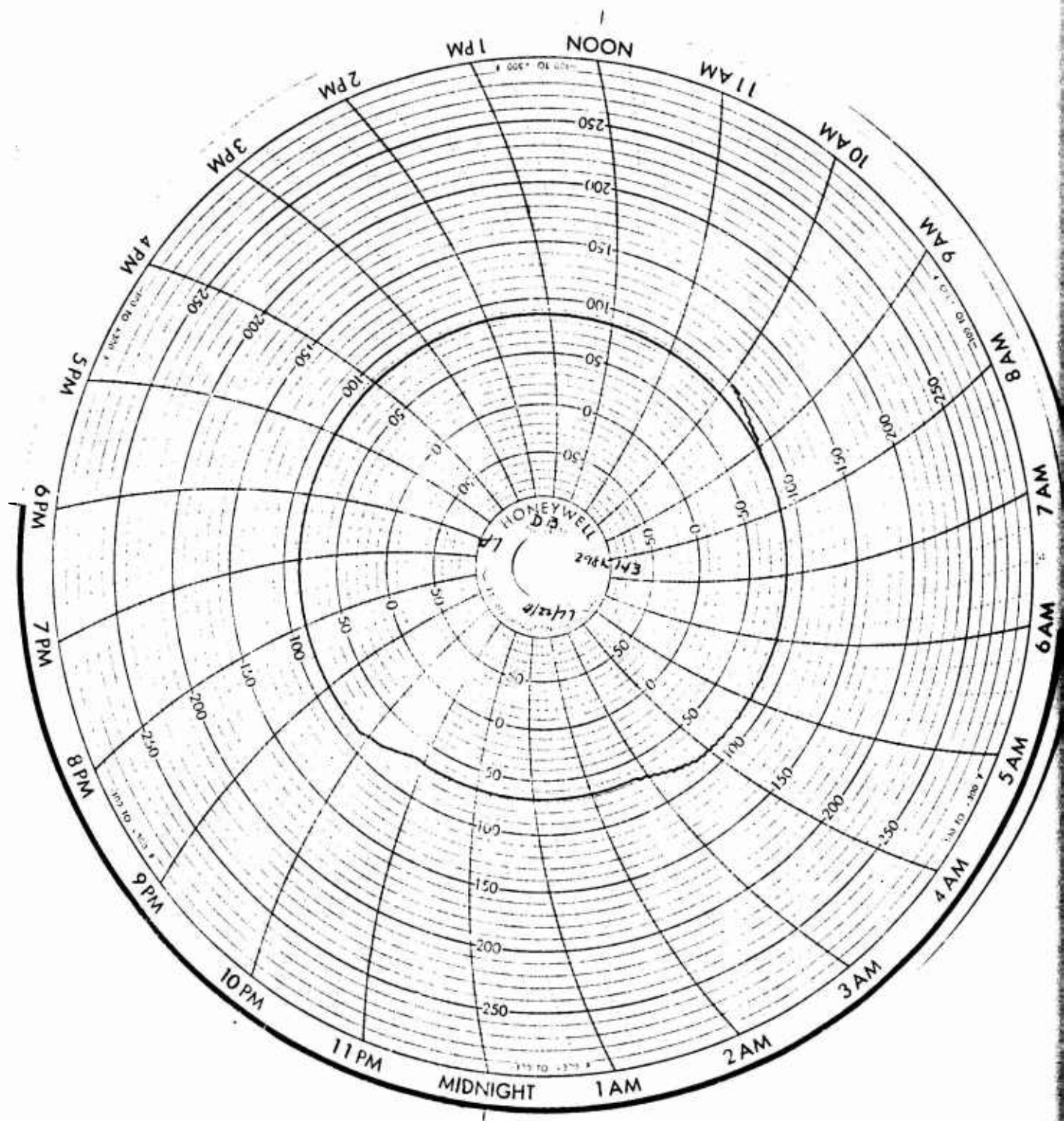


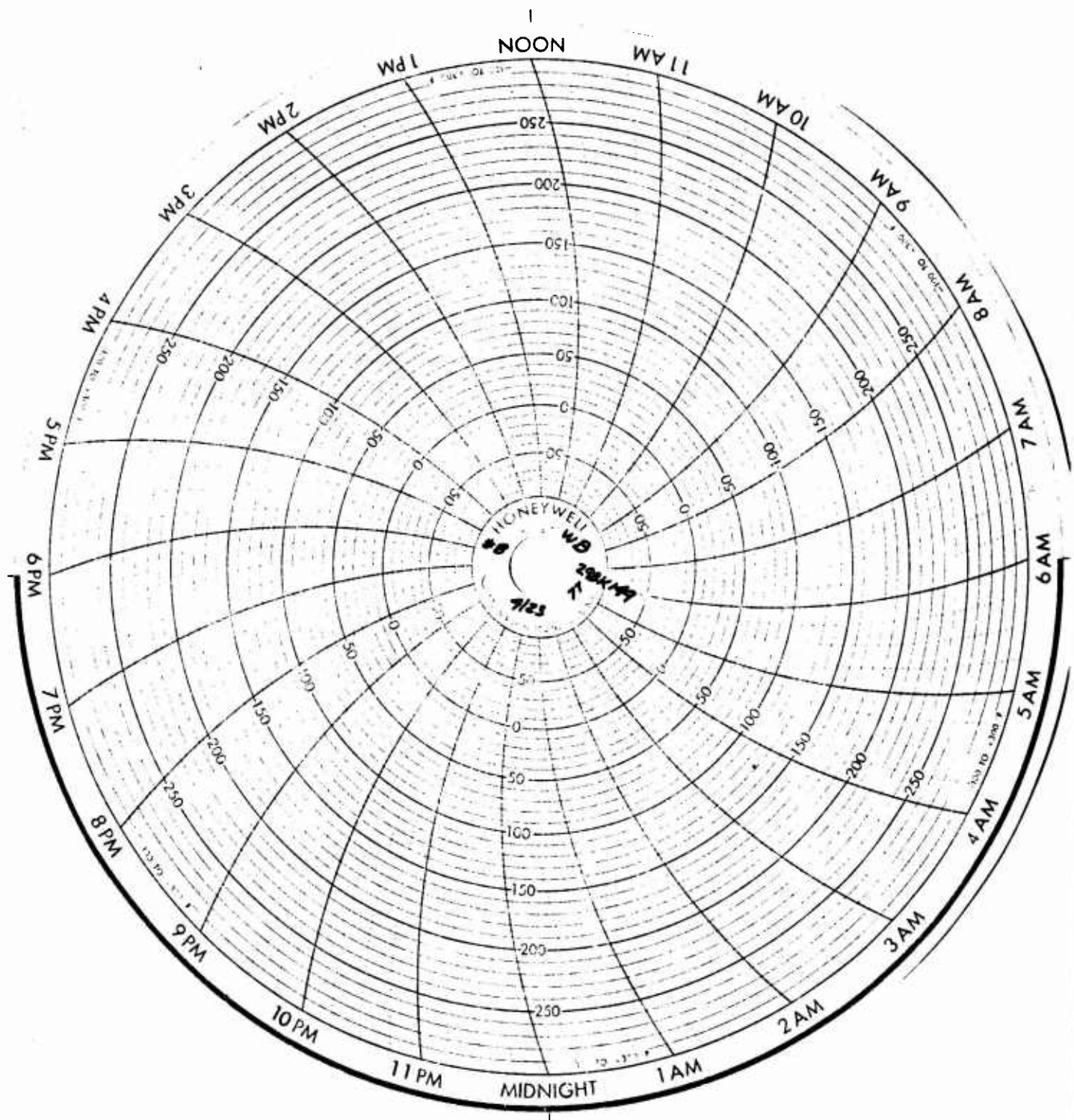


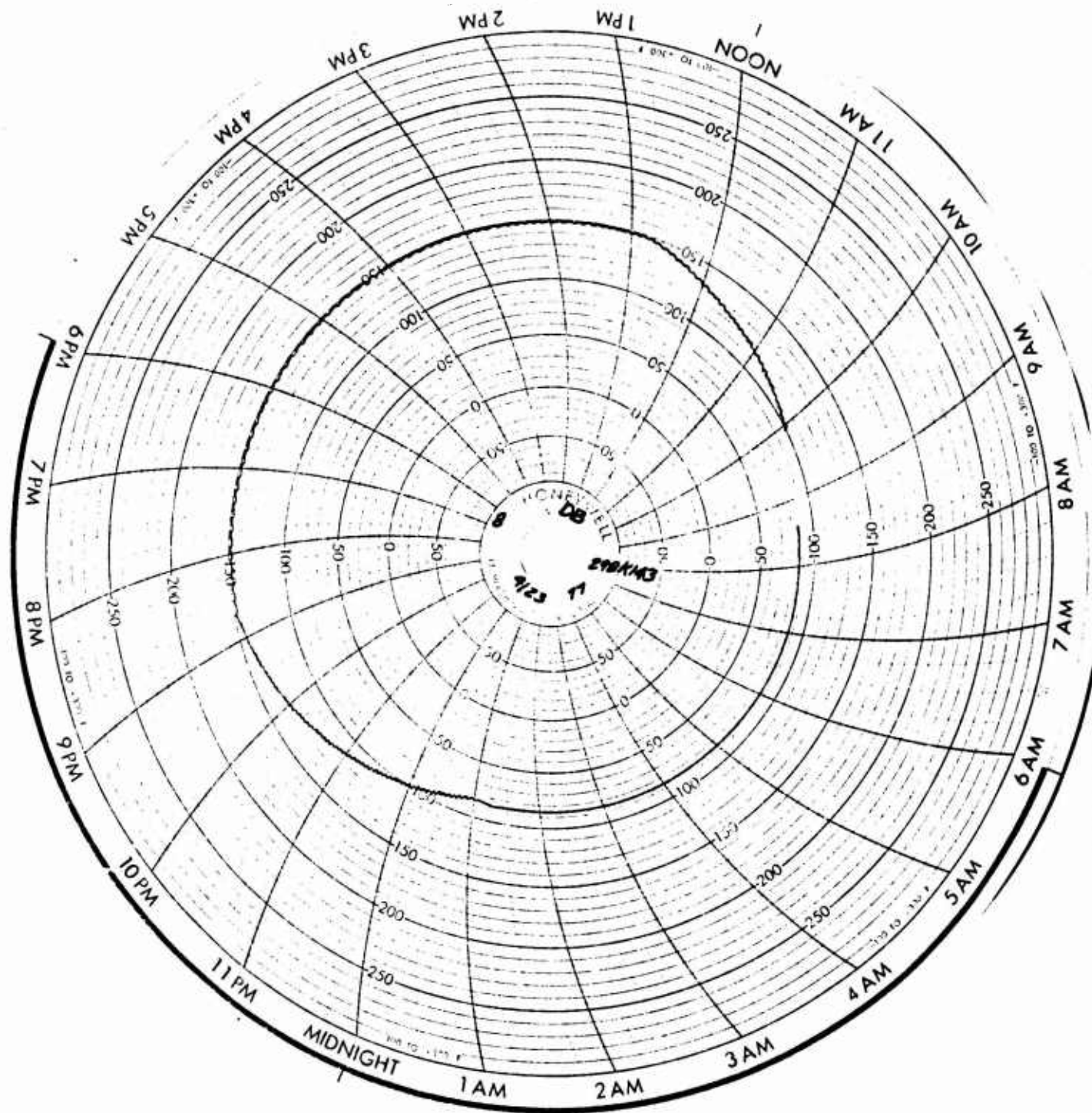


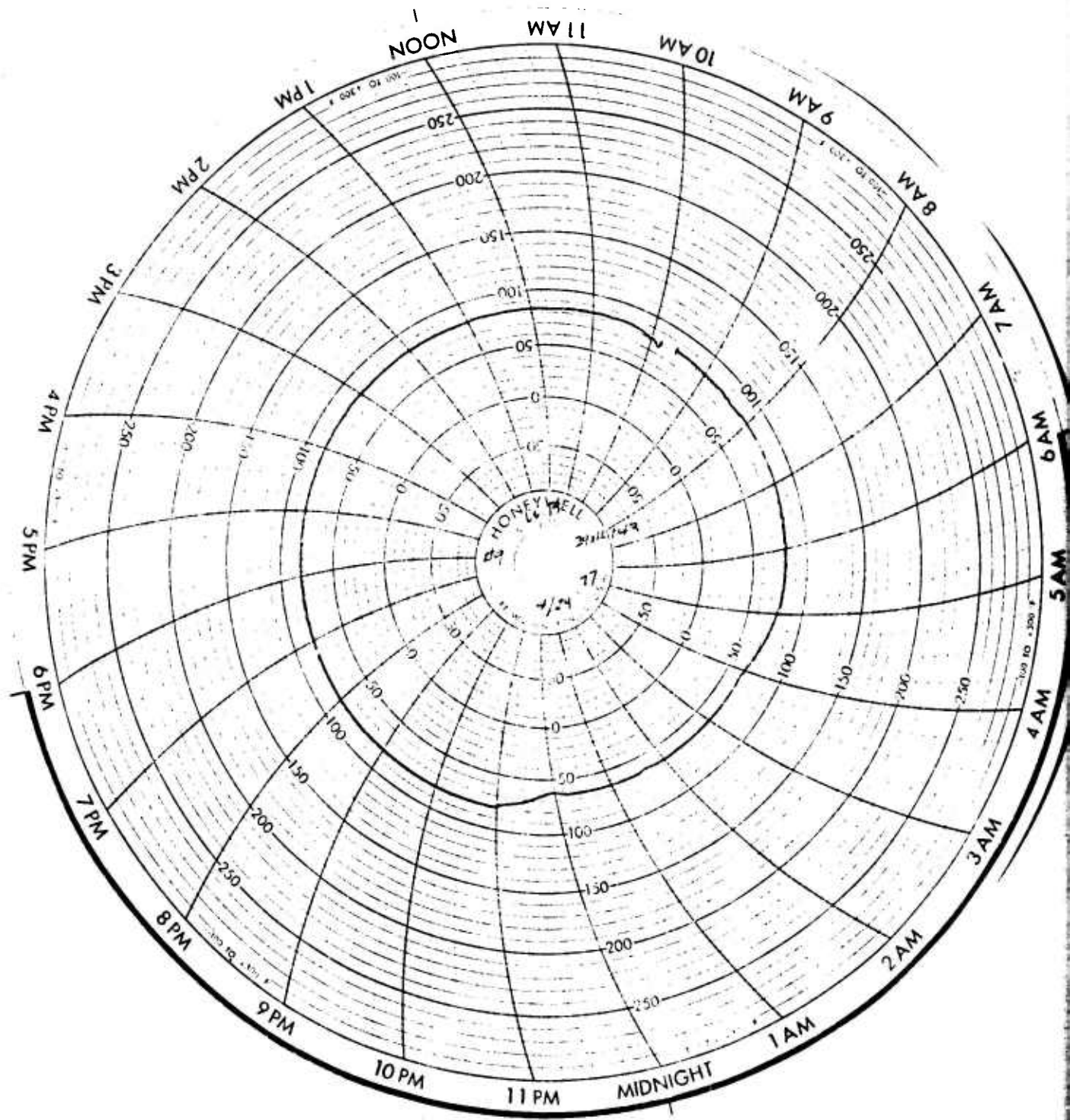




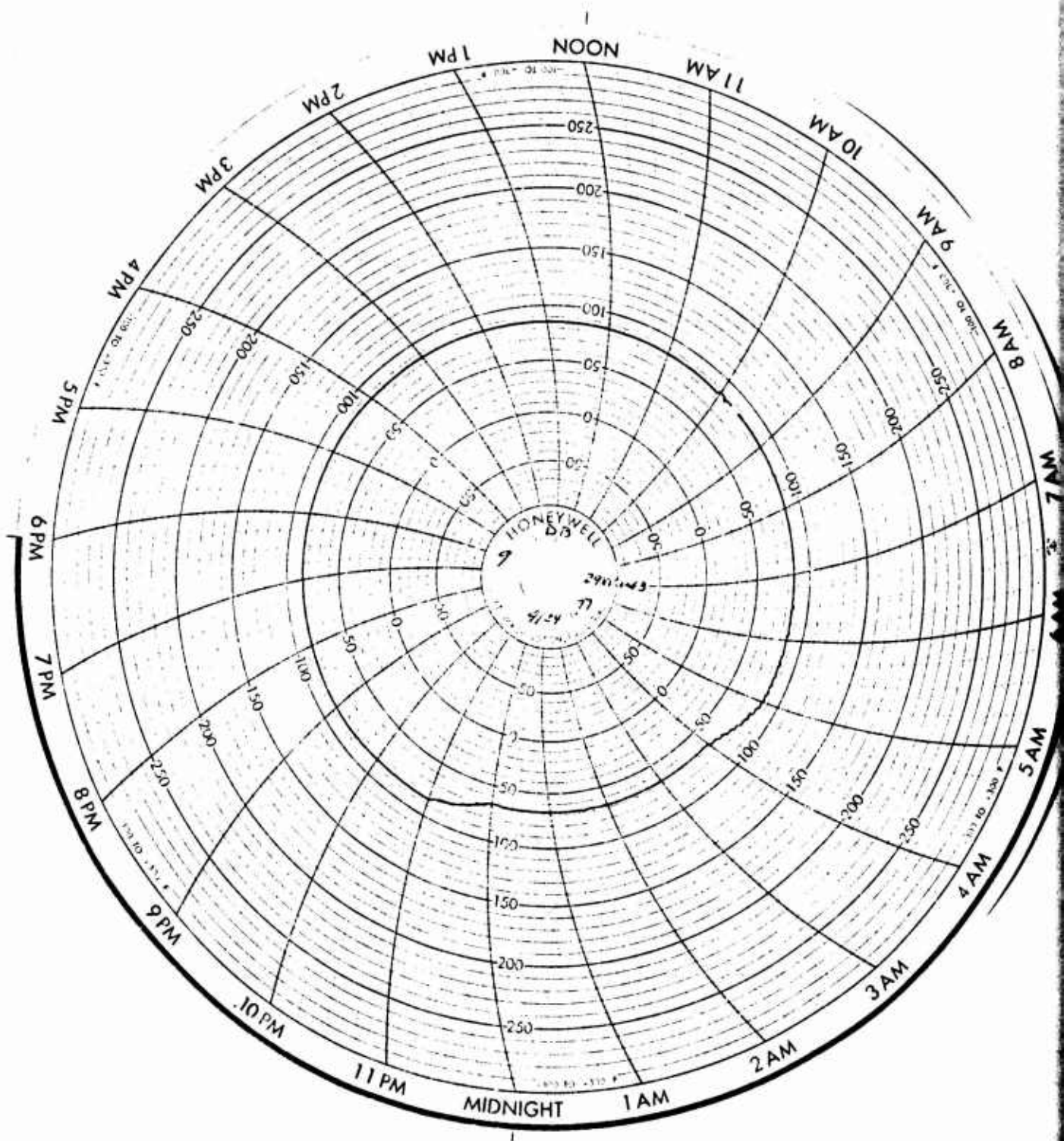


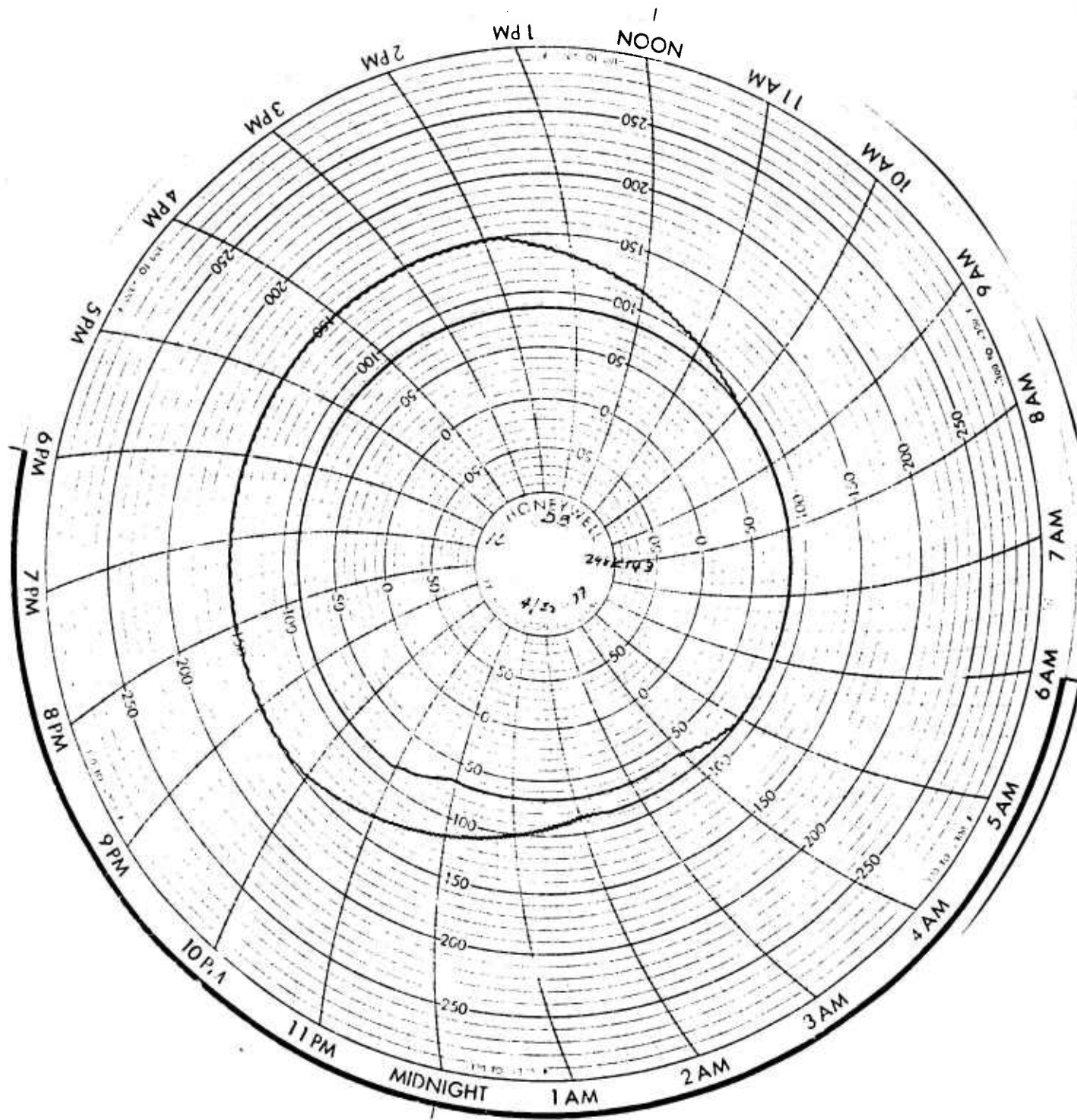


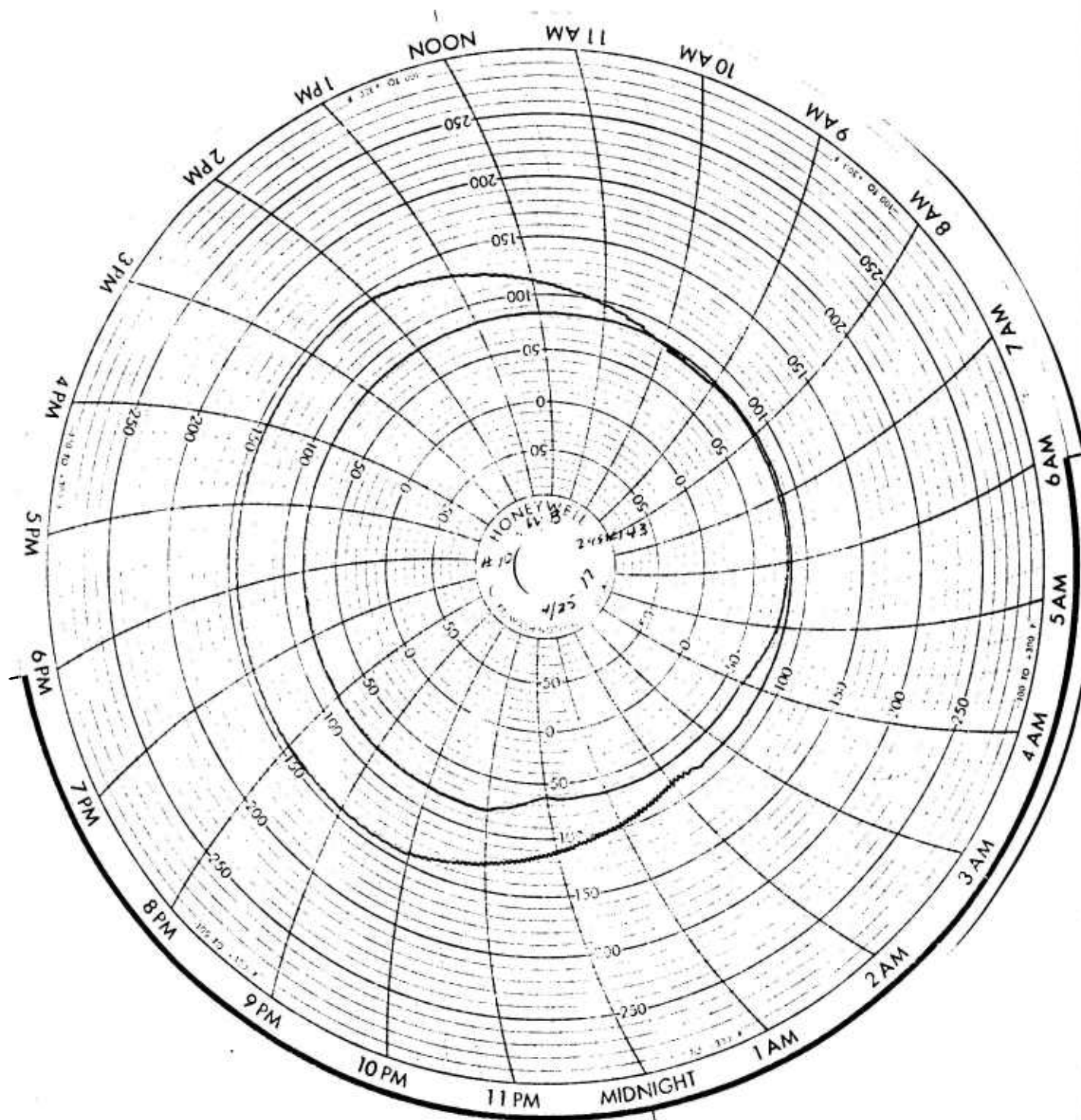


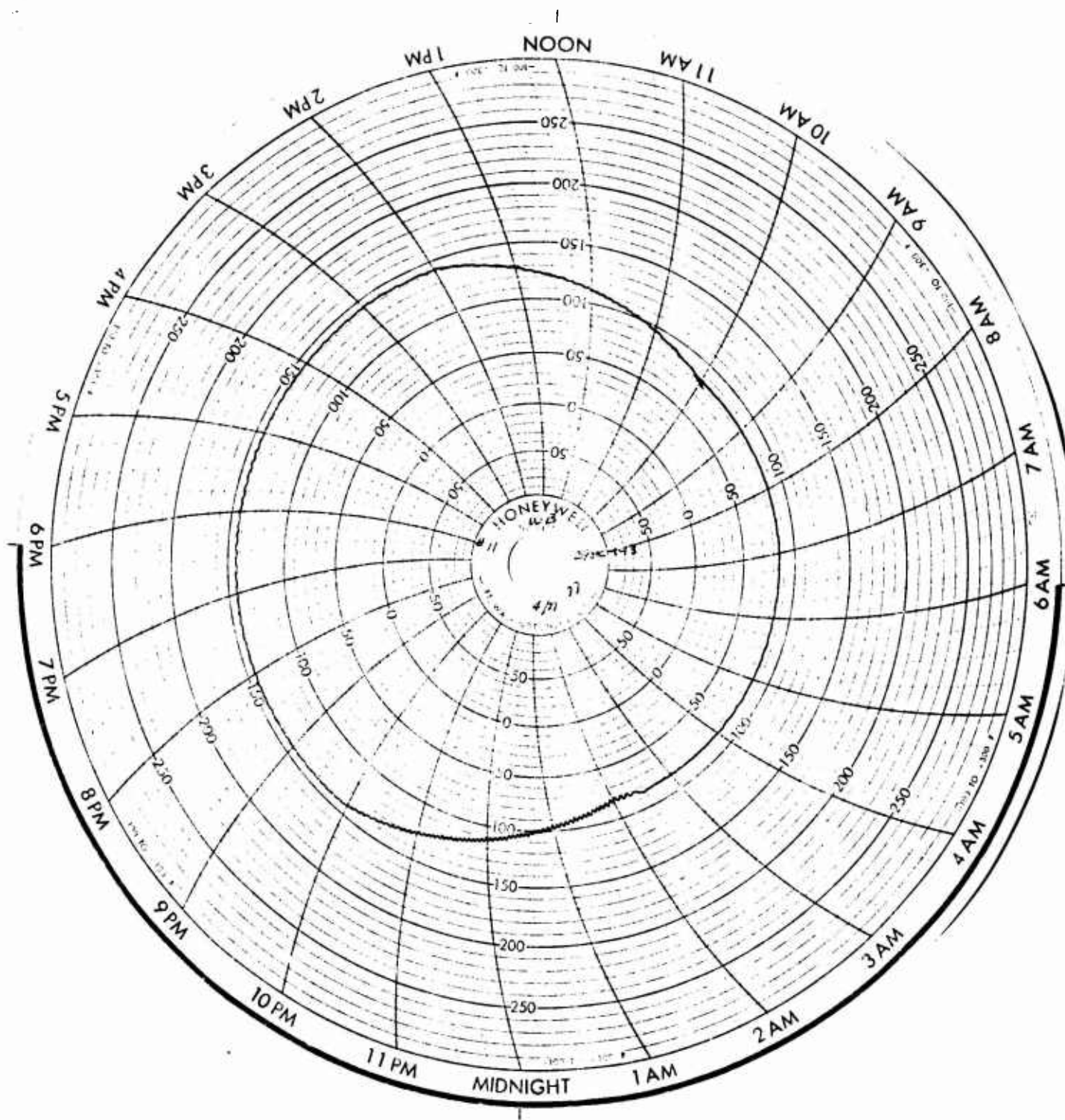




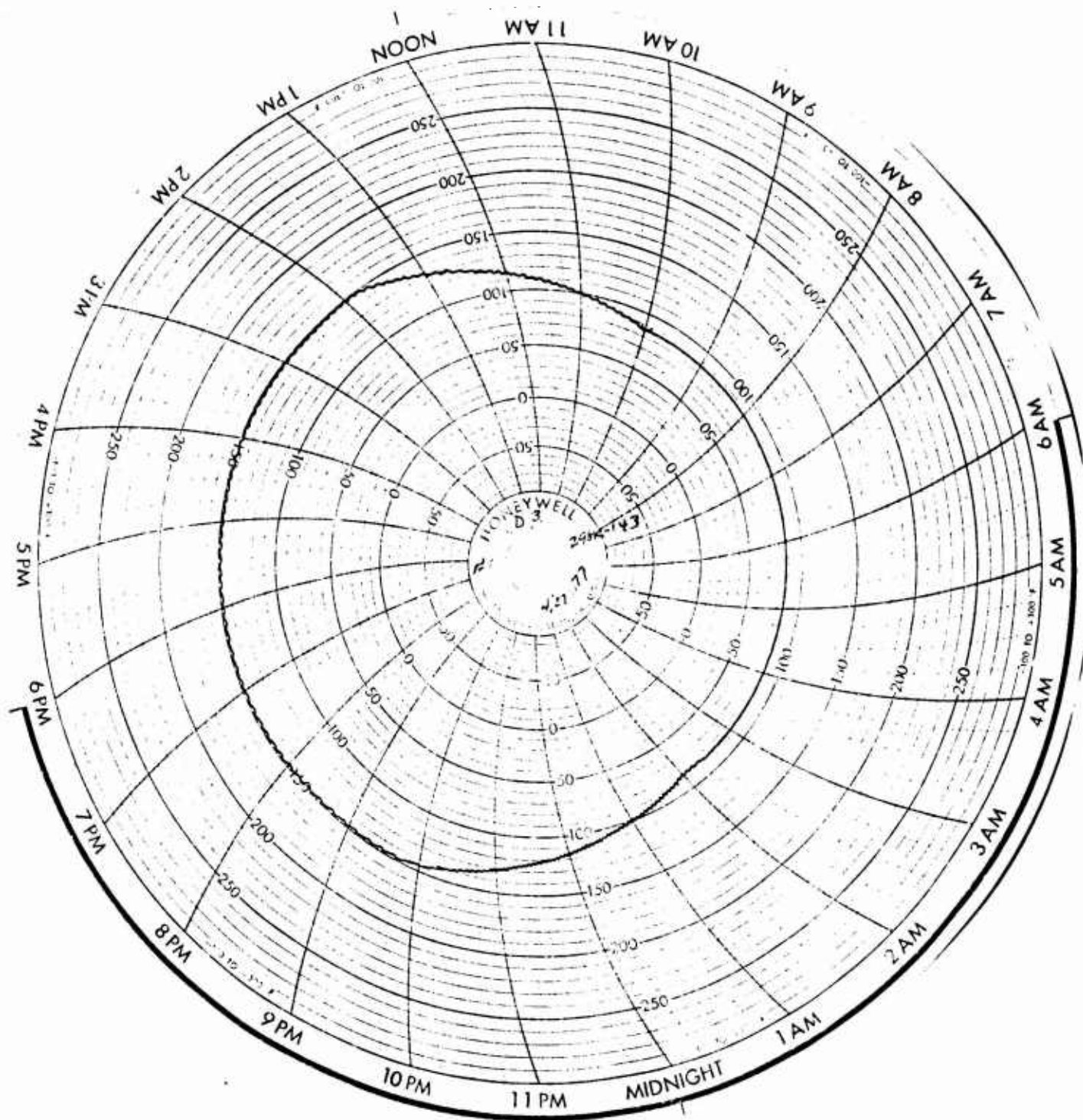


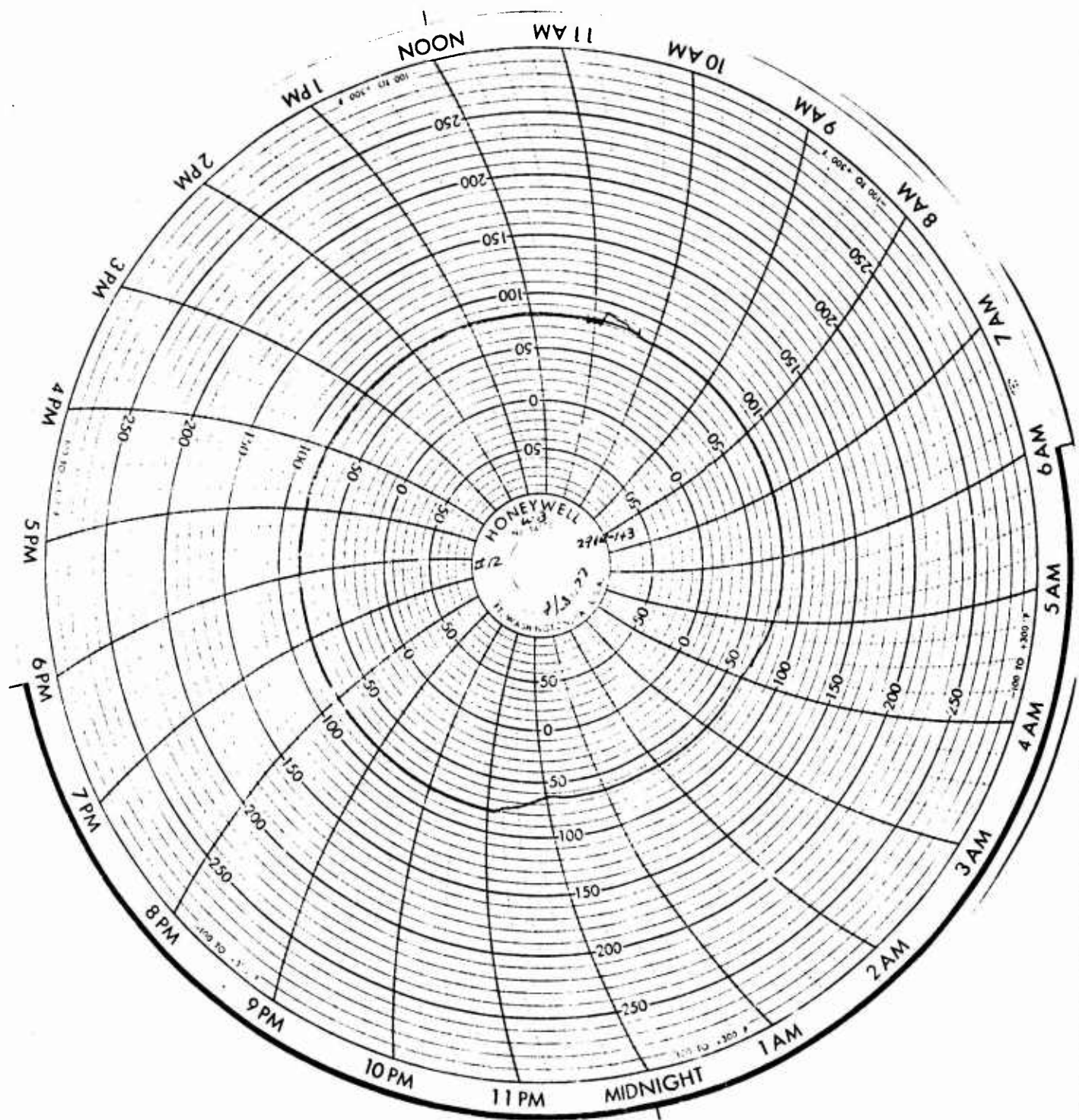


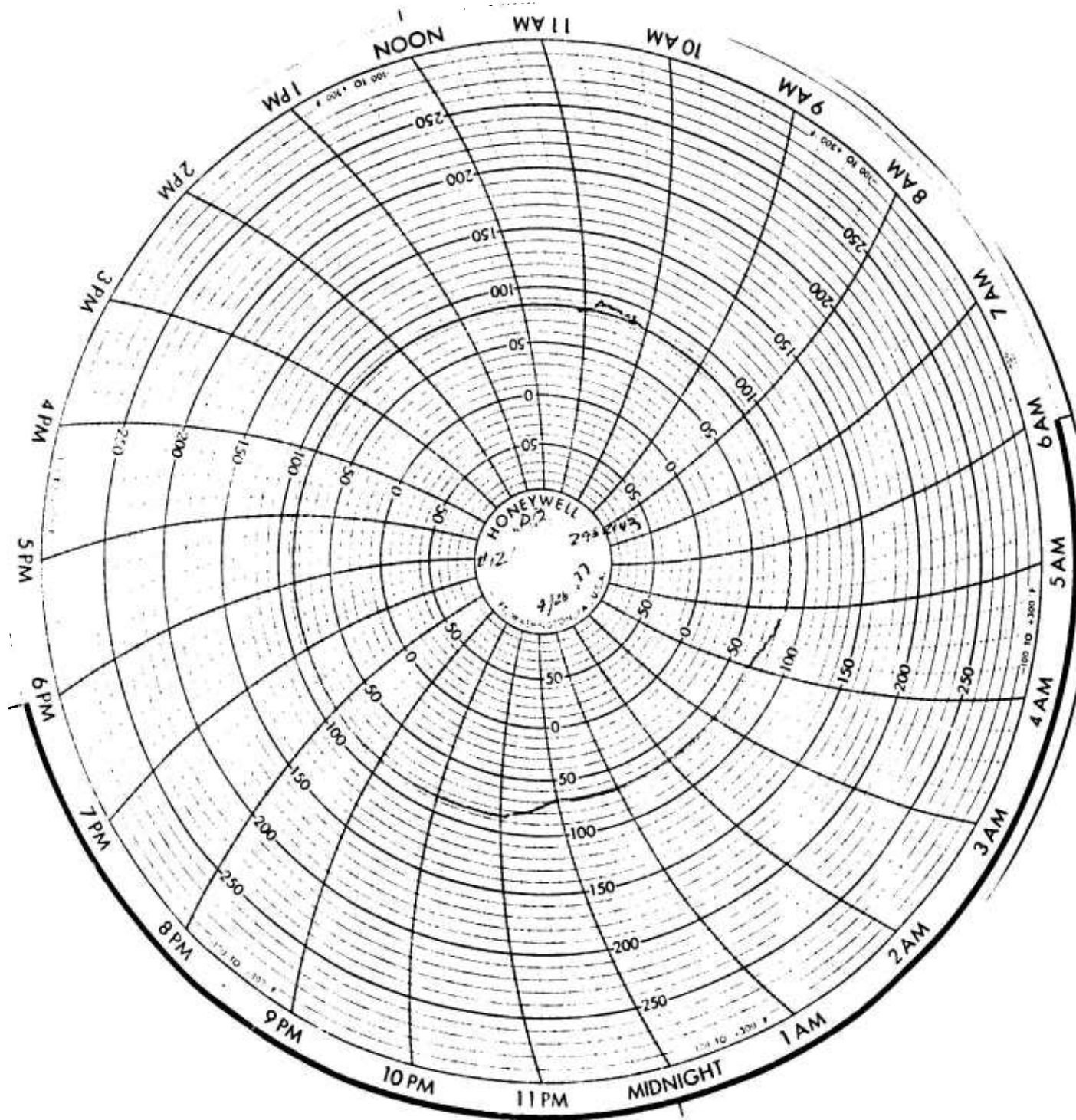




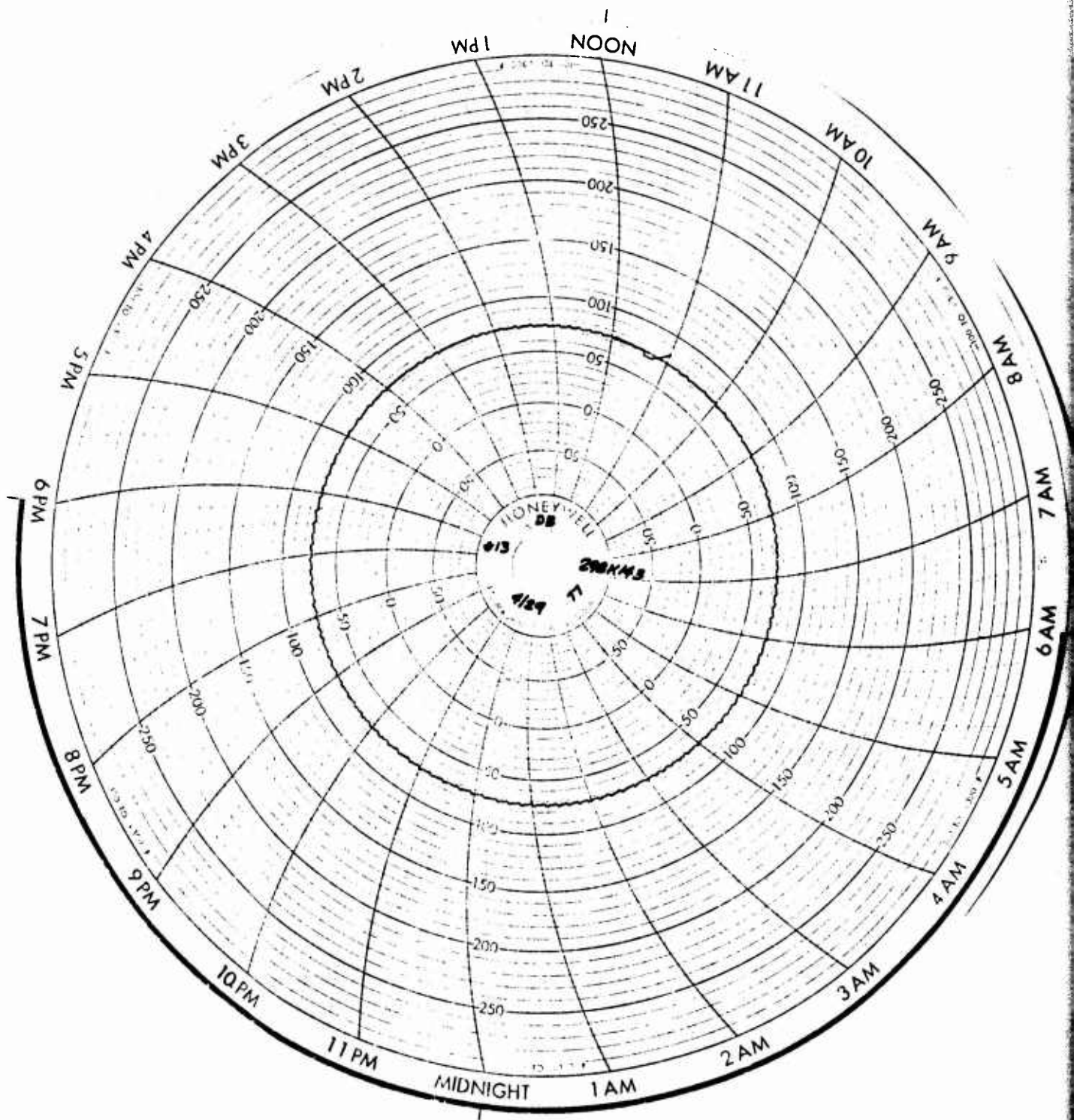


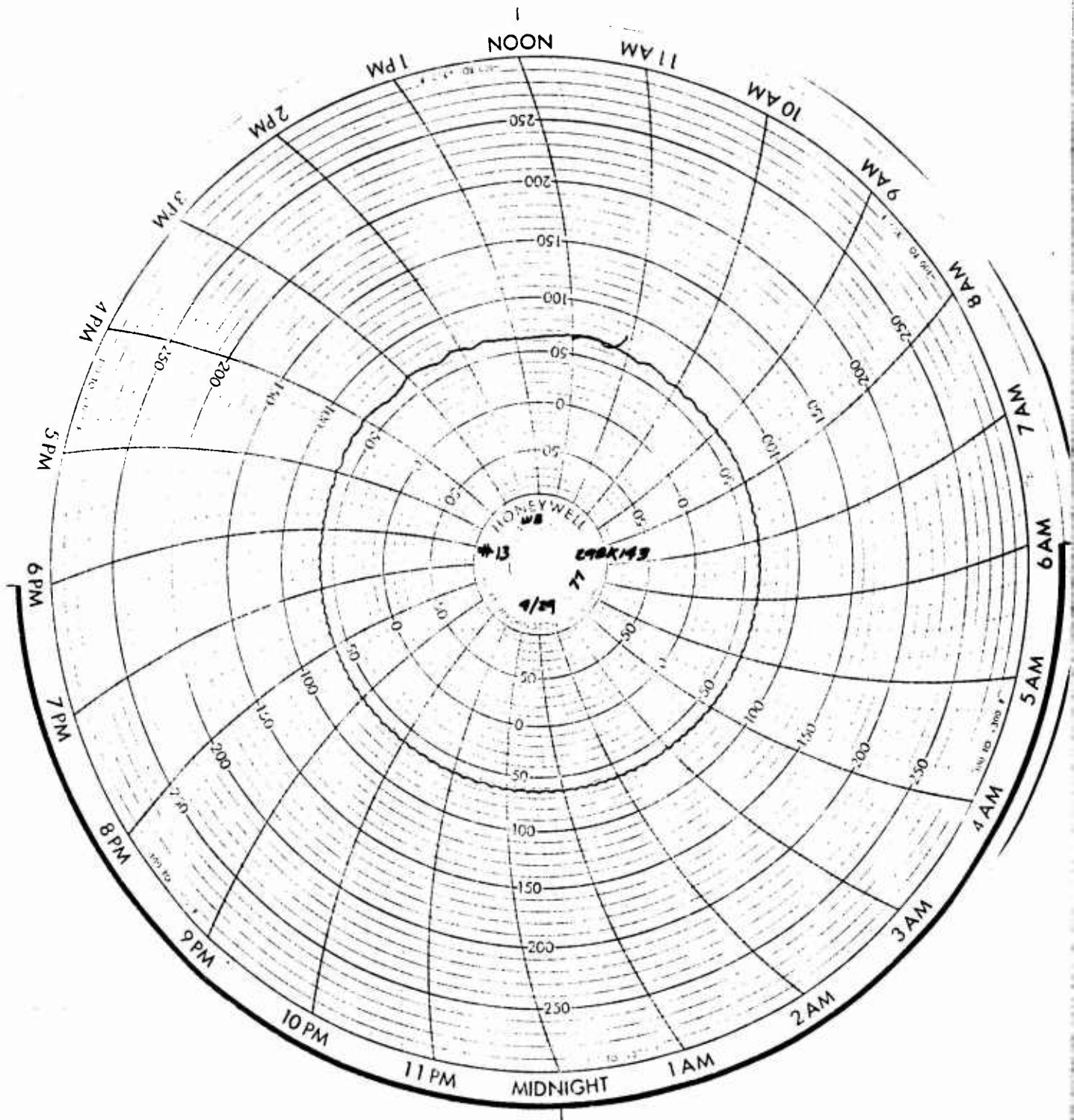












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